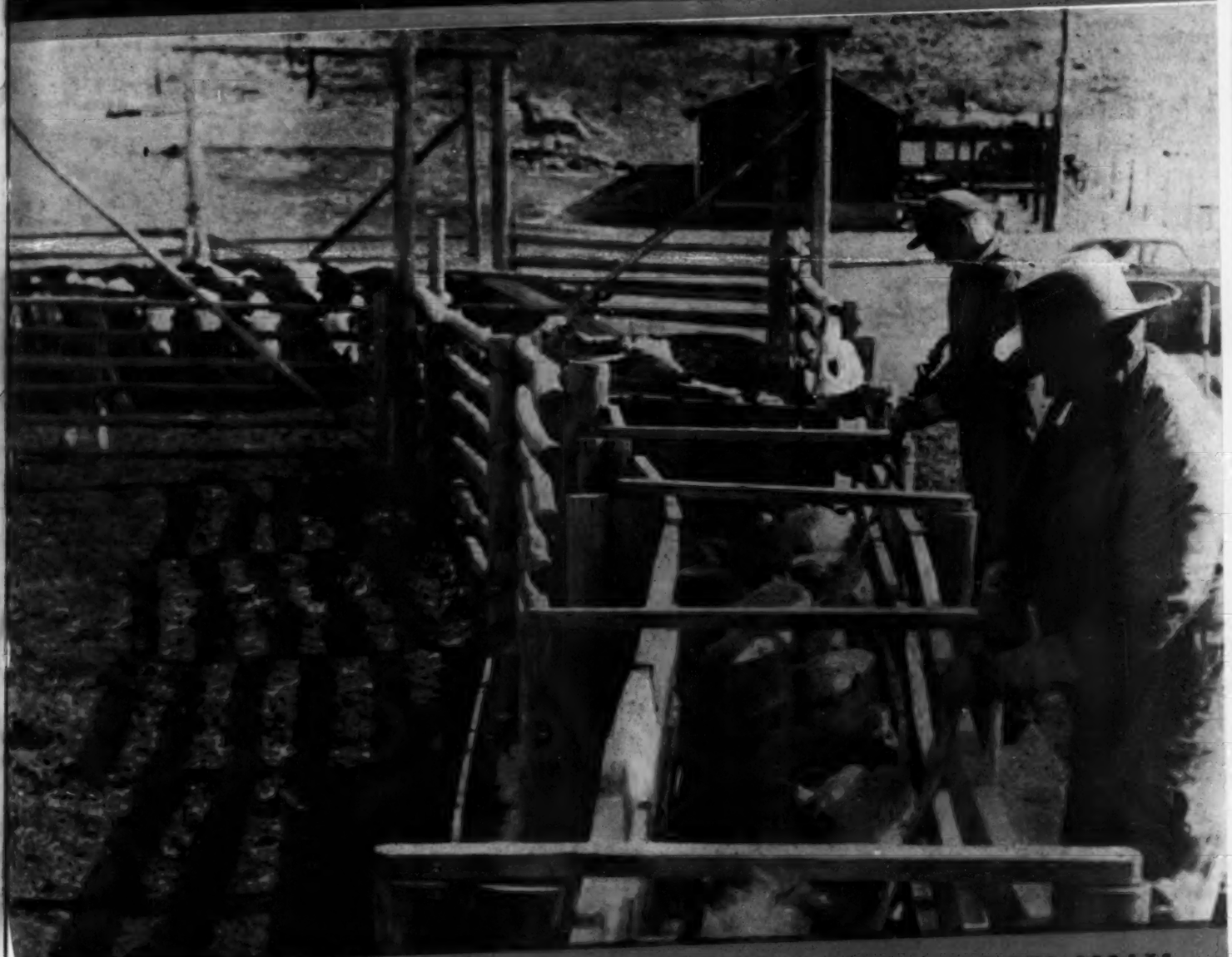
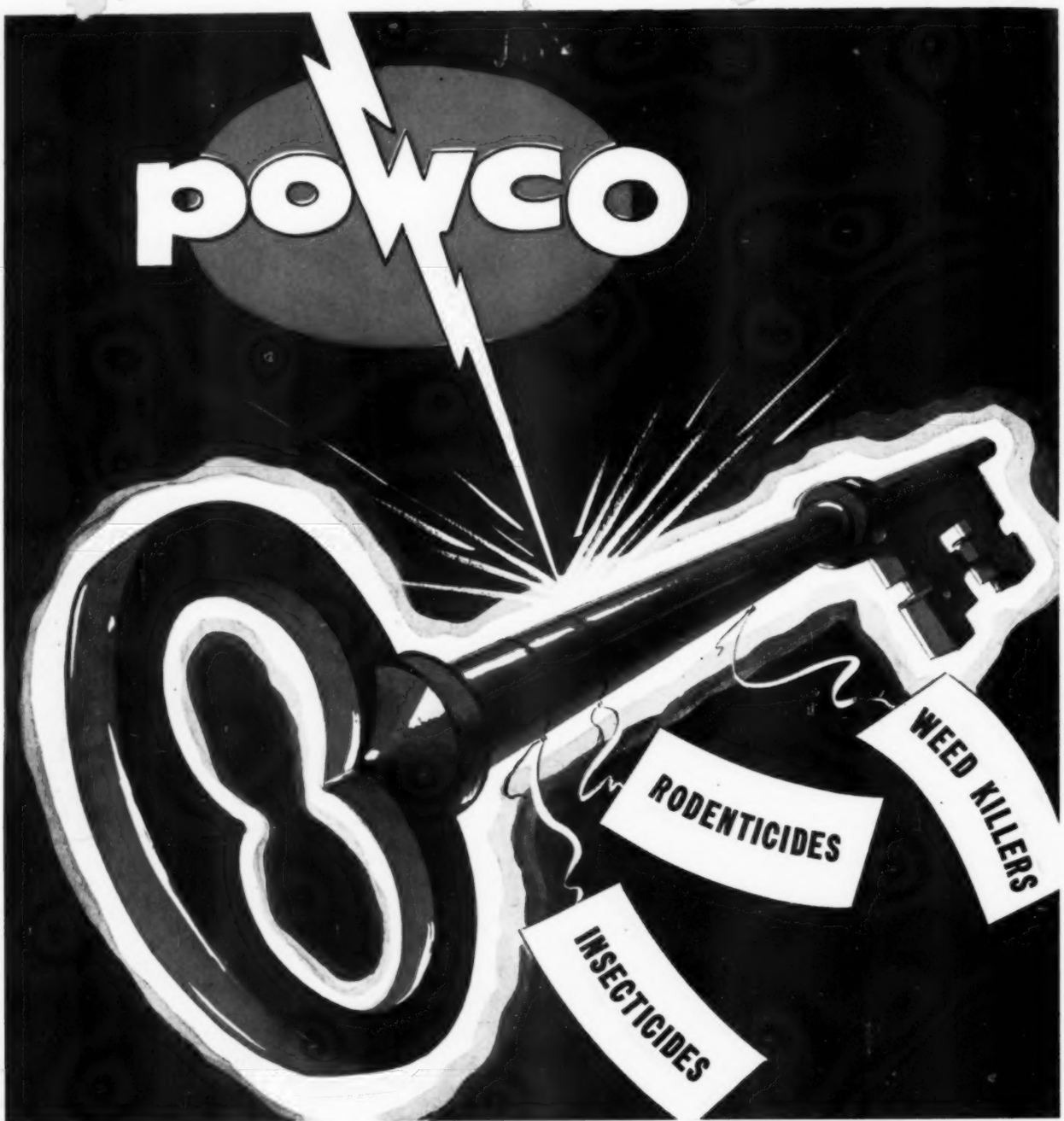
AGRICULTURAL CHEMICALS



AGRICULTURAL INSECTICIDES • FUNGICIDES • STOCK DIPS AND SPRAYS
FUMIGANTS • DAIRY FARM CHEMICALS • WEED CONTROL CHEMICALS • FERTILIZERS
SOIL TREATING MATERIALS • SEED TREATING CHEMICALS • RODENTICIDES

Volume III September, 1948 Number 9



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PYRETHRUM POWDERS AND EXTRACTS
STIMTOX "A"
ROTENONE POWDERS
SABADILLA
AEROSOL FORMULAS
2,4-D
BHC
(Benzene Hexachloride)
HETP
(Hexaethyl Tetraphosphate)
TEPPCIDE
(Tetraethyl Pyrophosphate)

the key to better products!

No matter what type of product you put out—insecticide, rodenticide or weed killer—it will pay you to investigate Powco Brand basic materials. Strict control every step of the way makes it possible for Powco to guarantee that your product will be better if you start with Powco Brand. Write today for full details on how we take out the risk before you buy.

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SALES OFFICES: CHICAGO • SAN FRANCISCO • PITTSBURGH • PHILADELPHIA • ST. LOUIS. **CANADA:** Charles Albert Smith Ltd., TORONTO • MONTREAL. **ARGENTINA:** John Powell y Cia, Buenos Aires. **JOHN POWELL INTERNATIONAL INC.:** Representatives in principal cities of the world.

You are assured on two important points — even in today's abnormal market — when you deal with P. C. A.

1. Quality . . . our Red Indian products are of unquestioned excellence.
2. Service . . . we make every effort to give you the service you want and deserve.

When better service is possible be assured P. C. A. will give it. Meanwhile your confidence, and your patience are greatly appreciated.

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GENERAL SALES OFFICE . . 50 Broadway, New York, N. Y. • MIDWESTERN SALES OFFICE . . First National Bank Bldg., Peoria, Ill.
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. . . the perfect answer to easier dust formulation

A carrier and diluent for insecticide dusts and powders must do not one, but many jobs. Otherwise, it isn't the best for your needs.

Attaclay, our carrier and diluent, is highly adsorptive—accepts highest percentages of liquid or low-melting-point solid toxicants.

As a powder, it flows freely and retains its free-flowing looseness after intimate mixing or superfine grinding with the toxicant.

It is compatible—physically, chemically, biologically. It fits right into the picture with various forms and kinds of pest-control chemicals.

It has a low bulk density (30 lbs./cu. ft.) that makes it go further per pound—cuts your cost-of-materials item.

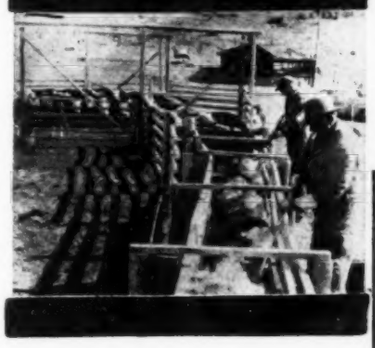
It has a proven record of superiority—from formulation to kill.

For over-all improvement of dusts—for the easiest and most resultful compounding you've ever known—you'll find Attaclay a superior diluent. We'll be glad to send a generous sample and provide guidance if desired.

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Philadelphia 5, Pa.

AGRICULTURAL CHEMICALS



A Monthly Magazine For the Trade

THIS MONTH'S COVER

Great progress has been made in utilizing new insecticides to free cattle from blood-sucking parasites. Here a herd is being power-sprayed with rotenone for cattle grub control, at Diamond Bar Ranch, Cody, Wyoming. See complete article, page 30, this issue. (Photo courtesy J. N. Nicholls.)

SEPTEMBER 1948
VOL. III No. 9

In This Issue:

AGRICULTURAL CHEMICALS

Subscription Rates: *One year* $3.00, *two years* $5.00. *Outside U. S. one year,* $4.00. *Published monthly on the 15th by Industry Publications, Inc. Office of Publication, 123 Market Place, Baltimore 2, Md. Advertising and editorial office, 254 W. 31st St., New York, 1, N. Y. Advertising rates made known on application. Closing date for copy—25th of the month previous to date of issue.*

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EASE OF FORMULATION

an added advantage of NIFOS T

(MONSANTO TETRAETHYL PYROPHOSPHATE, TECHNICAL)

Quick killing power, absence of residual toxicity problems and easy, inexpensive formulation have made Nifos-T the outstanding insecticide for control of aphids, mites, thrips and many other truck farm, fruit and vegetable pests.

Nifos-T can be formulated for spraying, dusting or aerosol application. Sprays are made in two ways: (1) By adding Nifos-T directly to water in the proper concentration, together with a wetting agent to assist spreading and to wet the insect; or, (2) By formulating Nifos-T as an emulsion. Emulsions are made by dissolving Nifos-T in a suitable solvent and incorporating an emulsifier. The solvent concentrate is then diluted with water.

Dusts can be prepared by proper formulation of Nifos-T with a suitable anhydrous inert carrier.

Nifos-T is compatible with other organic insecticides such as DDT (Monsanto's Santobane), benzene hexachloride, chlordane, and dormant and summer oils. However, it is incompatible with alkaline materials such as zinc, calcium, and basic lead arsenates or any mixture containing lime.

NEW USE DATA — An exceptional kill of green peach aphids on shade-grown tobacco has resulted from the airplane application of Nifos-T sprays consisting of one pint of 40% tetraethyl pyrophosphate to 200 gallons of water at a 75-gallon-per-acre rate. In a bulletin of the Georgia Coastal Plain Experiment Station, it is reported that a 0.66% tetraethyl pyrophosphate dust used at the rate of 15 to 20 pounds has also given very effective results. Both the spray and dust formulations have been applied by ground equipment as well as by airplanes.

If you would like complete information on all phases of Nifos-T formulation and application, send for a copy of Monsanto Technical Bulletin No. O-46. Write to Monsanto, Organic Chemicals Division, or ask for it on the coupon.

Spraying dairy cows with Santobane solution

SANTOBANE keeps cattle healthier, improves beef and milk yield

The economic importance of Santobane (Monsanto DDT) is especially emphasized in the control of livestock pests. Properly formulated and applied, Santobane rids animals of flies and other annoying insects — results in higher meat and milk production.

The low cost involved in treating with Santobane is far outweighed by increased profits. Here are typical formulations that have been recommended for livestock:*

BEEF CATTLE — Horn flies can be controlled by spraying animals at monthly intervals with 8 pounds of 50% DDT wettable powder in 100 gallons of water, or with ¼ pound of wettable powder in three gallons of water. Apply at a rate of 2 quarts per animal for each application.

DAIRY CATTLE — Spraying dairy cattle with DDT wettable powder will keep the animals free of horn flies and almost free of stable flies. If 50% wettable powder is used, mix ½ pound in 3 gallons of water, and apply 1 pint to each cow once a week.

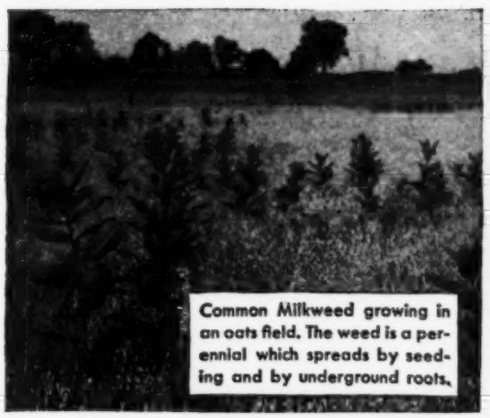
Santobane is available from Monsanto for immediate shipment at competitive prices. Carefully controlled manufacturing processes guarantee ease of formulation as dusts, wettable powders, solutions, emulsifiable solutions and aerosols. For information on all phases of Santobane formulation and application send for a copy of the booklet, "Santobane (Monsanto DDT)" . . . Write, or ask for it on the coupon.

*Source: "Fly Control," Circular 626, University of Illinois College of Agriculture, Santobane: Reg. U. S. Pat. Off.

Santobane widely used in "Fly-Free Community" Campaign

A nationwide war against disease-bearing insects is now under way, sponsored by the U. S. Junior Chamber of Commerce. Santobane can be counted on to help make this a successful battle in your community.

PROPER use of 2,4-D essential to satisfactory weed control



Common Milkweed growing in an oats field. The weed is a perennial which spreads by seeding and by underground roots.

In addition to being a recognized source for 2,4-D, Monsanto is further expanding its service in the field of agricultural chemicals by continuous study of proper application and use of this potent herbicide. Laboratory research and extensive field experiments have made Monsanto a source of much valuable information . . . Sound formulation and application procedures, based on these data, will help you wage a winning war on weeds.

Formulators are invited to send for their copies of Monsanto Technical Bulletin O-50, "2,4-D for Weed Control," which covers fully the following subjects:

POTENTIAL USERS

Home Owners • Park Boards • Hospitals, Schools, Institutions Road Departments Railroads • Golf Courses • Waterways Agricultural

PLANTS SUSCEPTIBLE

Annual and winter annual weeds • Perennial and biennial weeds Woody plants • Crop and ornamental plants

PHYSICAL AND CHEMICAL DATA

2,4-D Acid

2,4-D Sodium Salt

2,4-D Isopropyl Ester

APPLICATIONS

In lawns • In pastures Pre-emergence soil treatment • Selective control of weeds in growing crops

TYPICAL FORMULATIONS

2,4-D Acid
2,4-D Sodium Salt
2,4-D Isopropyl Ester

BIOLOGICAL DATA

Action on plants • Residual toxicity • Precautions • Effective concentration • Action on animals

Additional subjects covered are: cost of application, methods of application, patent situation, packing and shipping information.

NEW BOOK — For those interested in a thorough, but less technical, discussion of weed control, Monsanto has prepared a 36-page illustrated booklet, "The Killers in the Field." Copies are available on request from Monsanto, Organic Chemicals Division.

ORDER NOW — Monsanto now has 2,4-D available in three forms: 2,4-D Acid, 2,4-D Sodium Salt and 2,4-D Isopropyl Ester. Since it appears that supplies will again be short next season, formulators are urged to contract for their requirements at an early date.

Santophen 20 recommended for general weed destruction

Santophen 20 (Monsanto's pentachlorophenol, technical) is effective in destroying weed growth as it emerges from the soil, and for the general destruction of weeds along railroad rights-of-way, roadsides, ditch banks, pastures.

Santophen 20, properly formulated, is toxic to weeds in low concentrations. It provides an inexpensive herbicidal formulation for controlling weed growth without frequent costly manual cultivation. Because the soil is left undisturbed, spray control of weeds with Santophen 20 does not result in later weed growth through the bringing of more viable weed seeds close to the soil surface to germinate.

Santophen 20 is not soluble in water, but it can be used as an oil-in-water emulsion. This type of formulation is less costly than straight oil sprays and has wider applications.

Further information on Santophen 20 herbicidal applications is contained in a Monsanto Progress Report entitled "Destroy Weeds with Monsanto Santophen 20." To obtain your copy, write Monsanto, Organic Chemicals Division, or note your request on the coupon.

• • •

MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Akron, Cincinnati, Charlotte, Birmingham, Houston, Los Angeles, San Francisco, Seattle, Portland. In Canada: Monsanto (Canada) Limited, Montreal.

Santophen: Reg. U. S. Pat. Off.

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Organic Chemicals Division, 1700 South Second Street
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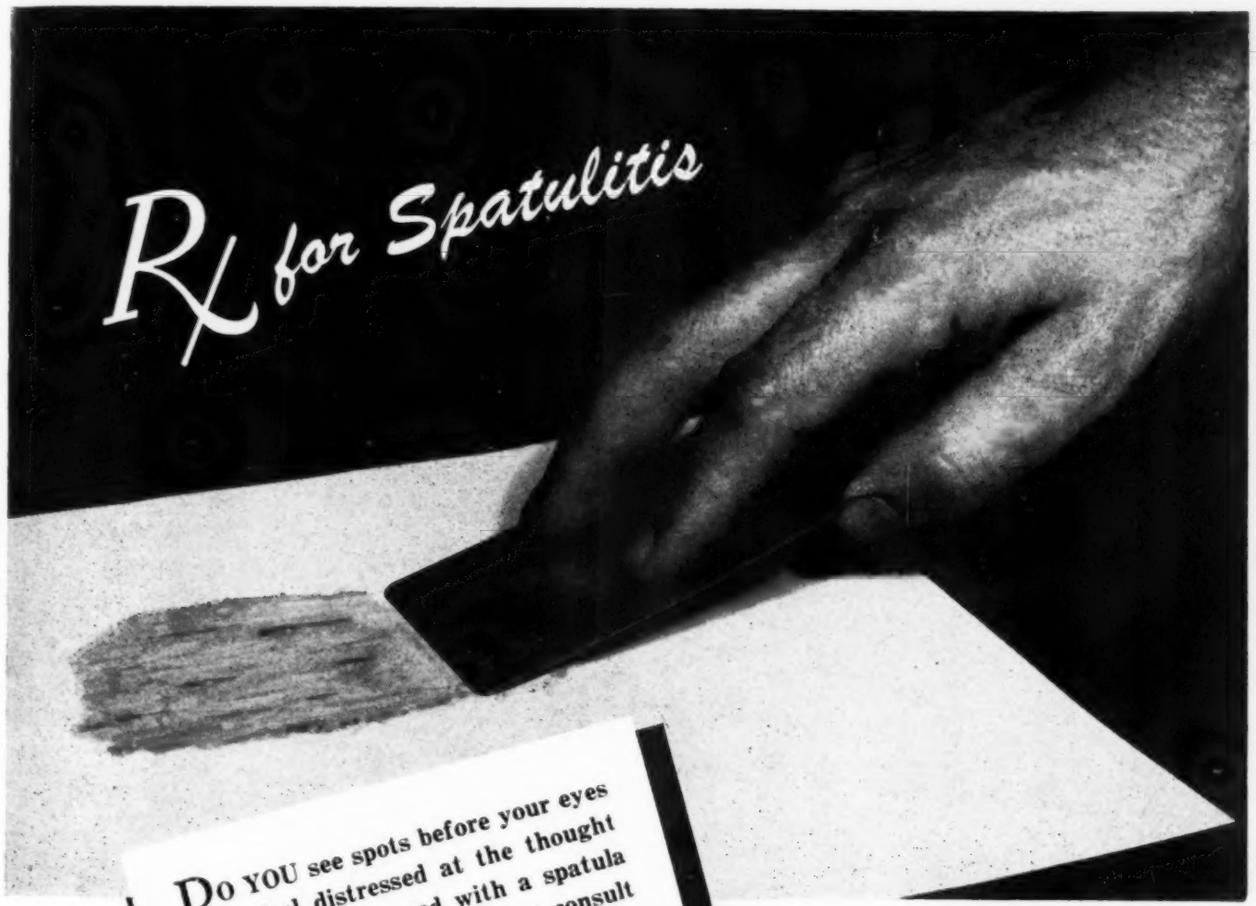


A CAREFUL diagnosis would probably reveal a lack of uniformity in your insecticide product — caused by inefficient or outmoded equipment . . . unsuited to the specialized job of producing a lump-free blend of high uniformity.

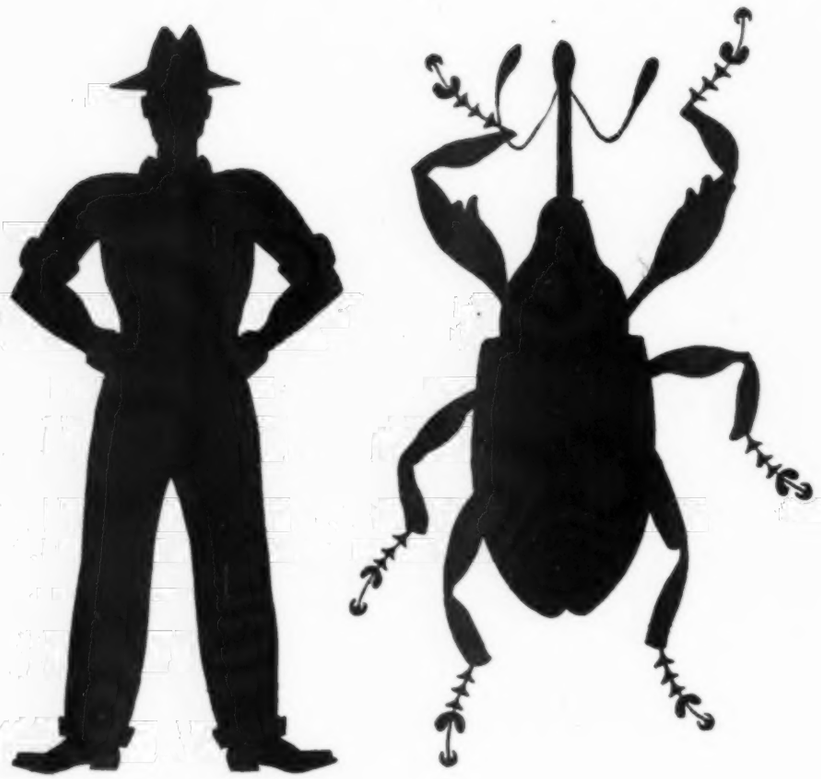
In over 30 states, satisfied users of Sprout-Waldron Intimate Blending Systems keep their customers happy. They have found the cure for SPATULITIS through low-cost, quality production.

As so successfully demonstrated in widely diversified installations, a Sprout-Waldron System is adaptable to the most rigid requirements of every dust producer.

When you buy Sprout-Waldron, you get a complete system engineered and specified in every detail by experienced men for greater production and a top quality product. The extras are: high efficiency . . . low operating costs . . . a safe, dust-free plant.

We believe that you realize the importance of planning for your 1949 equipment now. Accordingly, we are prepared to make specific recommendations to meet your individual installation requirements anytime at your convenience. Consult Sprout - Waldron and Company, Muncy, Pennsylvania.

SPROUT WALDRON
Manufacturing Engineers



which one picks more cotton?

Fortunately, the man does. But, each year the boll weevil finds millions of dollars' worth of easy pickings. The loss doesn't just mean fewer yards of textile goods, or pounds of margarine and salad oil. It means thousands less tons of high-protein feed that would have produced more eggs, milk, and meat.

The big job is to wipe out the weevil's take. It's a job for benzene hexachloride—new high-kill insecticide. CSC is producing technical-grade benzene hexachloride of a dry, flake type, all of which is going to manufacturers who grind and formulate insecticides.

CSC's Agricultural Division is working around the clock to make basic, agricultural products for use on American farms.

CSC

AGRICULTURAL DIVISION, COMMERCIAL SOLVENTS CORPORATION, 17 EAST 42nd STREET, NEW YORK 17, N. Y.


it means what it says!
Niagara
Niatox (DDT) Dusts and Sprays
BHC Dusts and Sprays
DDT Technical Grade
Lead Arsenate
Calcium Arsenate
Chlorkil (chlordane) Dusts and Sprays
Phoskil (parathion) Formulations
Hexcide 200 (tetra ethyl pyrophosphate)
Kolo-sulphur Dusts and Sprays
C-O-C-S Dusts and Sprays
Niagara Stik (anti-drop spray)
Sulphur products
Orchard and Crop Dusters
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PRIZE WINNERS

Crops Grown with Your Fertilizers Containing

INTERNATIONAL POTASH

You share in their pride of achievement when your farm customers win State Fair prizes for fruit and vegetables grown with your fertilizers.

Even more important to them, and to you, is the consistent production, year after year, of large yields of high quality, money-making crops . . . through the generous use of fertilizers.

The grade and uniformity and mechanical condition of raw materials are a big factor in your ability to deliver fertilizers that will produce dependably successful results for farmers. That is why so many leading fertilizer manufacturers use International Potash.

You will like the free-flowing characteristics of the clean, dry, granular crystals of International Potash. You'll find it easy to handle in car or storage, in mixing and in bagging. Its workability will save you time and money in manufacturing operations.

International Potash is mined and refined at Carlsbad, New Mexico and is prepared in the grades you require for the production of quality fertilizers.

SUL-PO-MAG (Water-Soluble Double Sulfate of Potash-Magnesia)
MURIATE OF POTASH • SULFATE OF POTASH

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POTASH DIVISION International MINERALS & CHEMICAL CORPORATION

GENERAL OFFICES: 20 NORTH WACKER DRIVE, CHICAGO 6, ILLINOIS

CONSIDER CONTENTS

. . . AS WELL AS CONTAINERS

The back-yard gardener wants a "bug and blight" dust he can use on everything he grows.

While available insecticides come close to meeting this requirement we are still waiting for the "universal" fungicide. In the meantime—if you use DITHANE Z-78 as the fungicidal ingredient in your small package line you can offer your customers products that will protect virtually all the garden vegetables and a number of ornamentals against a host of diseases.

DITHANE is more than just a *potent* fungicide —it is also a *safe* one to use on blossoms, foliage, and fruit of tomatoes, potatoes, celery, beans, cucumbers, onions, cabbage, egg plant, cantaloupes, peppers and others.

DITHANE Z-78, containing 65% zinc ethylene bisdithiocarbamate, is compatible with insecticides including DDT, RHOTHANE, rotenone and others.

In making your plans for 1949, you will want to investigate the advantages to be gained by using DITHANE Z-78 in your formulations.

For this information write Rohm & Haas today.

DITHANE, RHOTHANE *and* CUPROCIDE *are trade-marks, Reg. U. S. Pat. Off.*

Other Rohm & Haas Products that can help you make

BETTER DUSTS

RHOTHANE (DDD) an insecticide of the same general order of effectiveness as DDT—*10 times safer than DDT to man and warm blooded animals.*

YELLOW CUPROCIDE—a "neutral copper" fungicide containing 80% metallic equivalent.

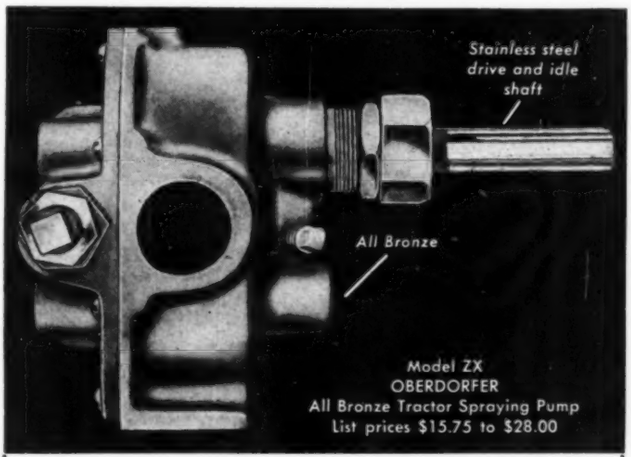
ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Manufacturers of Chemicals including Plastics • Synthetic Insecticides • Fungicides • Enzymes • Detergents
Germicides • Chemicals for the Leather, Textile, Ceramic, Rubber, Paper, Petroleum and other Industries

HOW CAN OBERDORFER SELL BRONZE TRACTOR SPRAYING PUMPS AT SUCH LOW PRICES ?

Because Oberdorfer Bronze Rotary Gear Pumps cost so little,—less even than ordinary iron pumps of comparable capacity—buyers are constantly asking, "How can Oberdorfer produce such high quality bronze pumps for so very little money?"



1. No corrosion with bronze and stainless steel.
2. Pressures up to 150 pounds per square inch.
3. Built-in adjustable pressure relief valve.
4. Lower cost than iron of similar design.
5. No priming to 15 feet below pump.
6. Four large Alemite lubricated bearings.
7. Easily installed by any mechanic.
8. ¼", ⅜", ½", ¾" and 1" standard pipe connections.
9. Backed by 50 years of bronze pump manufacturing.
10. All metal — no rubber.
11. From 2 gallons to 600 gallons per acre.

Here is how we do it:

FIRST, we have been making pumps of this same general type for 51 years—long enough to have learned all the ways of keeping pump production costs down without any sacrifice of quality.

SECOND, castings are a big share of pump costs and since Oberdorfer is one of the largest non-ferrous foundries, we naturally make all our own castings. This assures constant high quality at lowest cost.

THIRD, Oberdorfer sells bronze pumps of almost identical design in enormous quantities in a diversity of markets. Oberdorfer Pumps similar to those used in tractor spraying and other agricultural installations are sold to the chemical industry, to industry in general through mill supply houses, to the marine field (both engine manufacturers and marine hardware dealers) and to the fire-fighting equipment field. This high degree of standardization and very large volume reduces our costs.

FOURTH AND LAST, Oberdorfer has always deliberately kept its pump prices down, regardless of temporary fluctuations in costs. We have long since learned that low price means greater volume. Actually, we have made only a single 15% increase in price in the last 10 years!

THE RESULT? As practically all pump buyers know, Oberdorfer Pumps have virtually no competition in their size range. They are the *standard* which all others must meet.

Farm equipment manufacturers and dealers will be glad to know that with our increased facilities for bronze pump manufacture there should be no further shortages. There will be no reason for any weed spraying equipment being offered without the economy and quality of Oberdorfer Bronze Tractor Spraying Pumps.

Agricultural Pump Division, Oberdorfer Foundries, Inc.
5300 Thompson Rd. — Syracuse, N. Y.

AGAIN AVAILABLE

VATSOL

WETTING AGENTS

Manufacturers who had the opportunity of using VATSOL in their insecticides and fungicides, know the excellence of these wetting agents. Now that wartime scarcities have eased, the following are again available.

VATSOL* OT 100%

In pellet form this grade resembles paraffine, is somewhat soft and plastic and non-hygroscopic. Its solubility in petroleum and vegetable oils and absence of water makes this the preferred grade for oil sprays and other liquid concentrates where water is an undesirable component. Although not an emulsifying agent VATSOL OT is a desirable additive material when used with an emulsifier in preparing a miscible, fast-breaking, mineral oil stock.

VATSOL OT 85%

A heavy, viscous paste composed of 85% VATSOL OT 100% and 15% water. This is excellent for use in preparing miscible oils and fruit and vegetable washes.

VATSOL OT 70%

Contains 70% VATSOL OT 100% plus a neutral solvent and water. Because of its fluidity and ready solubility in organic solvents it is especially useful in concentrated liquid insecticides. This grade is not intended for use as a vegetable washing agent but is excellent for bulb dips.

VATSOL OT 25% Aqueous

Contains 25% VATSOL OT 100% and 75% water. This grade may be added directly to the spray tank or reduced to 10% strength and added to spray or wash solutions. Ideal for washing fruits and vegetables or for spraying with insecticides such as lead arsenate or nicotine sulfate.

VATSOL OS

A yellowish brown powder hygroscopic in nature. It is especially suitable for addition to dry insecticides or fungicides which are applied in the dust form. VATSOL OS can be used in rotenone dusts for crops as well as those for cattle grub control. This material is also excellent in preparing wettable sulfur when grinding for either 325 mesh or micron-sized sulfurs.

Further information on use and cost will be promptly furnished upon request.

**Reg. U. S. Pat. Off.*

AMERICAN CYANAMID COMPANY

Agricultural Chemicals Division

32-D Rockefeller Plaza, New York 20, N. Y.

Photo Courtesy Nebraska University Agricultural Extension Service

Here's news to please any hog-raiser: recent tests at the University of Nebraska have uncovered a new, simple, single treatment for control of sarcoptic mange mites on hogs . . . and also for hog lice.

Now, instead of three to five treatments at ten-day to two-week intervals, the hog raiser can check both mange mites and lice with but a single spraying of .25% of gamma isomer of Benzene Hexachloride (20 pounds of wettable dust of Benzene Hexachloride containing 10% gamma isomer in 100 gallons water). If hogs are thoroughly covered, including inside the ears, the treatment should be highly effective against both mange mites and lice.

PENCO W-12 Benzene Hexachloride, 12% gamma isomer—A micron-sized, wettable powder especially compounded for spray application. Ideal for sarcoptic mange mite and hog louse control. Thoroughly tested by State and Federal investigators, and by our own Whitemarsh Research Laboratories. Conforms to Pennsalt's rigid standards of quality and uniformity.

Write us for full details on
Penco BHC

AGRICULTURAL CHEMICALS DIVISION
PENNSYLVANIA SALT MANUFACTURING COMPANY
PHILADELPHIA 7, PA.
BRYAN, TEXAS — TACOMA, WASH.

promises even Greater Sales of Thompson-Hayward's fine Weed-killer...

...so order now.. beat limited supplies.. profit on next Spring's tremendous demand for...

AN OUTSTANDING FAVORITE ON THOUSANDS OF FARMS DED-WEED was the sales sensation of 1948. All over the Middle-West dealers ordered and reordered as consumer demand climbed higher and higher. Tested and accepted by thousands of farmers in 1948, DED-WEED is the sure-profit line in 1949.

ANOTHER BIG ADVERTISING CAMPAIGN WILL BUILD SALES FOR YOU Already, plans are being made to carry the story of DED-WEED to thousands of new buyers in 1949. Newspapers, magazines, farm papers, store displays and direct mail will help you sell more and profit more than ever before.

PLAY SAFE—BOOK YOUR 1949 DED-WEED NOW In spite of repeated expansion of our manufacturing facilities we are still unable to meet the tremendous demand for DED-WEED. Further facilities are now being added but we urge you most sincerely to assure yourself adequate early-season supplies by booking your 1949 requirements now with full price protection to date of shipment.

*Reg. U. S. Pat. Off.

THOMPSON-HAYWARD CHEMICAL COMPANY

AGRICULTURAL DIVISION

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MY PEDIGREE IS NO PROTECTION FROM INSECT PESTS!

It's open season all year for insect marauders. Penick DDT and Rotenone afford year-round control of insect depredations. DDT used from the middle of May until frost frees cattle of horn and stable flies—sprayed steers have gained as much as two hundred pounds in a year. Multiply by the number of head of cattle throughout the country and then calculate the potential outlet for your insecticides for the territory you serve.

The approach of fall and winter brings the need for rotenone for cattle grub and lice control.

The economic gain from livestock insect control is one of the outstanding achievements of applied entomology in the past two seasons.

We specialize and formulate particularly effective combinations. Why not address your inquiries for DDT and rotenone to us?

S. B. PENICK & COMPANY
ASHEVILLE • NEW YORK • CHICAGO

THE EDITOR COMMENTS

SERIOUS public health hazards may be lurking in new insecticides, weed killers and other pesticides unless proper control is applied to their sales and distribution, according to the American Medical Association. In an editorial in the *AMA Journal* last month, it was asserted that some of the new pest and weed killers "have caused the chemical contamination of some foods, thereby creating serious public health hazards. The insecticides include those materials which have been long in use, such as lead arsenate, nicotine and fluorine compounds, and new materials about which little is known, such as the organic phosphates, chlordane and . . . DDT."

The AMA continues by saying that controls must be established now, voluntarily or otherwise, before possible tragic consequences occur. "It is obvious," the editorial says, "That controls must be placed on the sales and distribution of products of unknown or incompletely known toxicity." Getting down to specific points, the editorial suggests that voluntary controls by producers should be tried first, then if these fail, control by legislation may need to be applied.

If the hazards in connection with use of some of these newer materials prove to be as serious as the AMA charges, the situation is clearly one that calls for action. It should be noted to the credit of the AMA, however, that its first very sensible suggestion is for voluntary control to be applied by the industry itself. Incidentally, the AIF Association has already invited AMA representatives to serve on the AIF committee along with representatives of state and federal agencies, the manufacturers, agricultural experiment stations, land-grant colleges, the food industry and sanitarians. The addition of AMA to the committee would no doubt be of real value.

So far as further regulation is concerned, however, it appears that the Federal Act of 1947 covers the subject in an adequate manner, and the states are likewise enacting some rather stringent regulations to control traffic in economic poisons. Public health records show that percentagewise, or even in actual numbers, the persons injured through use of insecticidal or weed control materials are very very few. With effective legislation already on the books, we still insist that the next step is to go further in the field of education. The AIF committee is working toward this end, and it seems likely that those who say "there ought to be a law," will find that there are already laws a-plenty. To impose very many more restrictions on the flow of economic poisons is likely to reduce greatly the over all use of these toxicants which are indispensible in modern agriculture.

AN editorial appearing on this page in the July issue of AGRICULTURAL CHEMICALS discussed the "veritable war" being waged in various parts of the country regarding the use of 2,4-D. Comments in that editorial reporting recent legislation restricting the use of 2,4-D in Louisiana has brought a letter from E. A. Epps, Chief Chemist of the Louisiana Department of Agriculture and Immigration, to lend further light on the situation in that state. He points out that last year a considerable acreage of cotton was damaged by the use of 2,4-D for control of water hyacinths, and that this season most of the damage from this weed killer has been in the rice area in southwestern Louisiana. "Although rice is the predominant crop in this section," he says, "There are many small farmers who depend on their cotton crop for their livelihood. When these peoples' cotton is severely damaged and their gardens ruined, it is a very serious matter. On the other hand, the Commissioner, (W. E. Anderson) is well aware of the value of 2,4-D for weed control, and had it not been for his intervention, the use of this chemical would have been completely banned in the State by the last session of the Legislature. The rules and regulations which have been set up governing the use of 2,4-D are felt to be the only alternative to complete prohibition of the use of 2,4-D."

He continues by stating in his own words

what we have been contending for a long time: "Careless and indiscriminate use of 2,4-D cannot be permitted, and if the operators do not exercise sufficient caution, and the manufacturers do not provide suitable warnings and possibly develop an educational campaign with regard to 2,4-D, these people themselves will be responsible for hamstringing the use of 2,4-D in Louisiana."

Mr. Epps has stated very aptly the basic principles which must underly the ultimate solution of problems arising out of the use of new agricultural chemicals. That the users of these materials *must* know what they are doing is more than obvious. The responsibility of teaching them rests jointly upon the industry and various state extension services upon whose word most of the operators rely.

AGRICULTURAL Science in Russia is taking on a new look. It's a new type of "science" based on Marxist ideas as expounded by Prof. T. D. Lysenko, whose few opponents yielded meekly upon learning that Lysenko's theories had been accepted by the U.S.S.R. Central Committee. Upon decree of the Committee, agricultural plants in Russia must henceforth comply to Lysenko's genetic theories, and forget all about Mendel's laws of heredity. Apparently, "western and bourgeois" genetic laws are not to be observed by farm crops in the U.S.S.R. on pain of extinction.

This was all arranged neatly at the recent eight-day conference of the All-Union Academy of Agricultural Science held in Moscow. Lysenko opened the meeting by announcing that plants and animals can transmit acquired characteristics, and condemning all geneticists who disclaim this. He belittled his opponents and demanded uncritical acceptance of his views, even when they were not supported by experimental evidence.

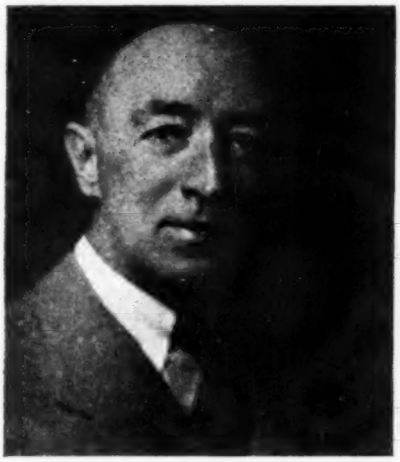
The few who opposed his ideas, citing numerous experiments supporting the chromosome theory of inheritance and pleading that Soviet science be allowed to move ahead without being confined to the theories of one school only, were overwhelmed by the Lysenko forces. Following the "unanimous" acceptance of the new views, the Academy of Agricultural Science sent a letter to Stalin informing the premier that Soviet agricultural science is the most advanced in the world. Re-writing university textbooks and a revision of courses in biology and related sciences to remove all traces of foreign views, are reported next on the agenda. Nothing like political pressure to make scientists think straight.

REPORTS from the Plant Disease Survey of the U. S. Department of Agriculture emphasize that the field of plant disease control is far from being static. Of late a number of diseases have gained a foothold in the U. S. which in the past had never been of serious nature. Also such diseases are appearing in areas from which they had been completely absent previously. As though to add mystery to the general picture, other diseases have suddenly developed into serious proportions only to subside just as quickly and inexplicably. The Plant Disease survey points out that not all of these maladies are controllable by chemical means, and that for some outbreaks, no controls are known at all.

Dr. Paul R. Miller of the U.S.D.A. comments that some of these diseases are not important, at least at the present time, but the fact that such epidemics seem to appear without rhyme or reason, emphasizes that neither farmers, nurserymen, foresters, nor plant pathologists may expect to settle once and for all, every plant disease problem.

Chemical controls have done such an effective job in halting numerous blights and other fungus diseases, that hope is inspired that chemistry may also find the answers to some of the more stubborn problems. In the meantime, research laboratories both federal and private are continuing to do a remarkable job in developing new methods for the use of chemical weapons against plant diseases.

Guest Editorial written especially for this issue of Agricultural Chemicals.



Past Year is Regarded as One of Achievement

by

George F. Leonard

President, Agricultural Insecticide and Fungicide Association

THE 1947 season in the agricultural insecticide and fungicide industry was marked by substantial progress on several fronts, particularly the increasing use of pest control measures in grain-producing areas.

More than ever before, the record of this season reveals, the American farmer has recognized the fundamental role played by pest control in achieving production.

This year, too, was highlighted by unexcelled cooperation and teamwork between governmental agencies, Federal and State, farmers and farm organizations, and members of this and other industries which are directly concerned with pest control. And the public generally, it may be added, is becoming increasingly aware of the importance of man's never-ending battle against insects and other pests which attack crops and livestock.

Reviewing the record for 1948, the industry's contributions to the nation-wide emergency food and feed conservation program were of special significance. So also was the effort initiated by the Agricultural Insecticide and Fungicide Association to resolve new and complex problems stemming from the development and introduction of various new organic chemicals now widely used in agricultural pest control. This year, as always, the industry was confronted with the necessity for making adjustments as the farmer-demand for its products went up or down, depending upon the extent of pest infestations.

The food and feed conservation program and its implications cannot be fully appraised at this early date, yet partial returns would seem to indicate that this project might well prove to be an important milestone in the history of our industry. Certainly it has served to focus public attention on agricultural pest control as never before. The combined efforts of the Government, industry, farmers and others participating in this conservation movement have boosted yields

(Continued on Page 59)

How Experiment Stations Help Develop

NEW PESTICIDES*

DEVELOPMENT of the State Agricultural Experiment station in America has been in the process for nearly a century. Its prototype dates back to an experimental farm set up by John Bennett Lawes in England, financed by a fortune he had made from his 1836 patent on fertilizer manufacture. He had discovered the method of making superphosphate from treating natural phosphates with sulfuric acid. His early experiments on soils, fertilization and crop production were well conceived, and some have been carried on to the present time.

In America, however, the development of agricultural research has followed an entirely different pattern which precluded to a considerable extent the participation of commercial enterprises. It has required many years for the chemical industry of the U.S. to realize fully its responsibilities to agriculture, and there is some doubt even yet that all segments of the industry have awakened to this realization.

American prototypes of the modern agricultural experiment station were the series of state agricultural societies which sponsored competitions for prize fruits and vegetables, the interchange of agricultural information and the establishment of trial plots for the evaluation of varieties and practices.

One of the earliest of such stations was at the University of California, Berkeley, in charge of Professor Eugene Hilgard. Reports of his work spread so that he was chosen to write the section on cotton for the 1880 census. This was done so well that Congress was impressed with the potentialities inherent in the experiment station idea. In 1887 the Hatch Act was passed setting up Agricultural Experiment Stations in all of the states in association with the land-grant colleges for experimentation in agricultural practices. Thus, relatively early in our development, the responsibility for agricultural experimentation was placed by federal mandate and state acquiescence in the federal Department of Agriculture and the State Agricultural Experiment Stations.

Many who are still fairly active can well remember when one or two men, the State Entomologist and possibly a deputy, dispensed for their state all the information concerning insect control, administered the state regulatory work relating to insecticides, taught all the courses in the State University ranging from apiculture to taxonomy and carried on some hobbies in taxonomy to maintain their reputations as scholars.

Some present here started in entomology when the only chemical insecticides were Paris green, London purple, lead arsenate, sulfur, lime-sulfur, kerosene emulsion, carbon bisulfide, nicotine, HCN, pyrethrum and quassia. Little attention was paid to formulation and the basic products were purchased over the counter like salt, sugar or definitive drugs.

There was no ethical problem involved in the use of the tax-payer's dollar when the station recommended home-made lime-sulfur as a control for San Jose scale any more than when a home economics teacher developed the proper recipe for a sponge cake. Shortly thereafter, however, commercial concerns began to manufacture paste preparations and a ready mixed lime-sulfur that simply required mixing with water. Homemade kerosene emulsions were supplanted by commercially prepared miscible oils, the iodine number became important for summer oils; and almost overnight we were confronted by trade names that had no relation to the ingredients and the formulations of which were changed from week to week to correct apparent breakdowns or failures. We were then well launched on the parade of commercial insecticides which has increased in momentum and volume like a rolling snowball.

Everyone in Quandary

NOW the Experiment Station entomologists who previously could recommend ethically the use of a homemade kerosene emulsion was placed in a quandary as to whether he should recommend one of the commercial successors, "Kleen-All" or its competitor "Kleen-Sweep," particularly when he knew that the formulation of either might change once or twice even while he was applying his tests.

We thought that the situation was complicated in the "teens" and the 1920's but in the '30's' the war years and now in the post war period, the multiplication of products has become even more baffling. One could hardly expect any single toxicologist to identify the active ingredient or ingredients in all of the insecticides now on the market, not to mention differentiating them on a basis of formulation. Adequate field trials of even a fraction of these commercial products on the different commercial crops in California alone, under the

*Prepared for delivery before A.I.F.A. meeting, Spring Lake, N. J., September 8, 1948.

by

Dr. Stanley B. Freeborn
Assistant Dean, College of Agriculture
University of California

various climatic conditions in this one state, would require the services of more entomologists than there are available at the present time.

To illustrate some of the difficulties that might arise from the indiscriminate use of chemicals about whose reactions our knowledge is not crystal clear. here is the outline of a research problem in which the California Station has been interested:

A few years ago we discovered that cattle in certain areas in California were being poisoned by molybdenum in the forage plants they were eating. Now molybdenum is an essential micro-nutrient of plants, but when certain plants are grown in soils containing 1.5 to 3.0 ppm, these plants store in their tissues as high as 20 ppm which is a toxic dose to young stock. Herefords usually bright brown in color became a sickly yellow, scoured badly and many of them died. Older stock were also affected if the dosage was higher. This would seem to be a perfectly simple straightforward case of poisoning. However, it is only the beginning of the complications. California's alkaline soils that contain 1.5—3 ppm produce toxic plants. In England, where the same difficulty occurs, the soils must contain 20-100 ppm before toxic forage is produced. Again in some of the toxic areas in California leguminous plants will show 20-100 ppm while non-leguminous forage plants growing in the same pasture will absorb but 10-12 ppm and are non-toxic. Among the leguminous plants ladino clover absorbs higher concentrations than alfalfa. Again in affected areas the ground water, through continuous leaching, is apt to have ten times as much molybdenum as the surface water that flows through the area. There is also evidence that leguminous crops will extract a toxic proportion of molybdenum from the soil the first year of planting, with smaller amounts being present in succeeding years. Furthermore, whenever we have an exceedingly wet year the water table may rise to the point where salts are being elevated to the root zone, and areas that have been free of molybdenum poisoning may become seriously affected.

One or all of these contingencies may develop with the accumulative addition of any one of our new stable insecticides. If they should behave as molybdenum does, the results obtained in California would be of little significance on the Eastern seaboard and vice versa. At the California Station it took a large share of the time of two soil chemists, two biochemists, a veterinarian, an agronomist and an animal husbandryman, together with the assistance of several field men and laboratory analysts, for the better part of two years, to ascertain the factual details that I have condensed into a paragraph above.

How far should the stations be expected to extend their research endeavors in order to do this type of protective, detective work for all the commercial chemicals? Suppose we do all the necessary work for one product in a given formulation at a given dosage on one host plant for one year? Experience would indicate that our results in California might not be applicable in Maine or Mississippi. What effect would another diluent have or, twice the dosage? It might be safe on snap beans, which we used as test plants, but what about the 200 other crops that are grown commercially in California? If it caused no damage the first year, could we be sure that doubling the amount in the soil by the application of the next year's dosage would still be innocuous? At the present on much of California's bean land, growers are applying DDT or DDD at rates of 10, 20, and even 30 pounds per acre before planting for wireworms, and following with a dusting for other insects as the crop matures. Thus they are adding 2 - 3 ppm annually to the plow zone of large areas of valuable land without too much knowledge as to what the eventual results may be.

World War II tipped the scales as far as the insecticidal problem was concerned. DDT was the talisman of modern entomology. Whether this development, its allies and analogues, are milestones of progress, or vice versa, depends on the course we plot in the very immediate future.

Some time ago an industrial concern that manufactured detergents, adjuvants and synergists for insecticidal formulations, proclaimed in a brochure the vast amount of research which they had carried on to assure the efficacy of their products, their harmlessness to plant and animal life (other than insects), but in small type at the end was a disclaimer that vitiated every statement they had previously made. In effect, they had no responsibility whatever as to whether their products would injure plants, animals or human beings.

Where does this responsibility rest? Who is to tell the gorwer what products he can use safely over a period of one year, three years or ten years? We know that the trials of herbicides on the Atlantic seaboard with their humid, acid soils are far from applicable to the conditions in the arid, alkaline soils of the West Coast. We know that trials of DDT on some species of cucurbits have shown that this insecticide can be safely employed, while other species are killed by the same application. Who is to test its applicability to every species of insect, every strain of

plant species and every variant of soil and climate? And then when these problems are solved, what about the multiplicity of dilutions, formulations and all the analogues with their combinations and permutations?

Basic Research Needed

THE most popular sort of the so-called "research" that the state experiment stations can do is the screening and evaluation of new insecticidal products. Growers readily accept any pronouncements that the experiment station workers can give on efficacy and formulation, as the last word in insecticidal practice. One wonders whether the growers' best interests are being served by people who are guided only by empirical standards which vary with host plants, with climate, with soils and with nutritive gradients of the plants concerned and probably with many other factors.

It seems that the way out of this labyrinth of endless replication of empirical trials is along the line of basic research that will establish the possibility of fixing "tailor-made" insecticides, fungicides and herbicides.

How do certain insecticides gain entrance to the insect body? What systems and tissues do they attack and what radicals of their chemical constitution are responsible for penetration and for toxic action? This information is lacking even for Paris Green, one of our earliest insecticides! It is possible that we do not know how any of our present-day insecticides actually kill insects!

How to answer some of these basic problems was a critical problem before the last war. With the strides that industry has made since that time, it becomes *super*critical. If we capitalize on our best opportunities for progress, the time has arrived for us to develop a division of labor that will lead us out of the confusion that we have erected for ourselves.

The state experiment stations are just now completely submerged in screening and testing the multiplicity of new compounds, their formulations and dilutions that are being placed on the market by various manufacturers. Highly qualified toxicologists and ocologists who should be working on principles of their fields are testing formulation A verus formulation B and concerning themselves with empirical tests of killing efficacy, phytotoxicity and residue removal.

In the meantime, there is not in use today one tailor-made insecticide based on fundamental research or any other factual basis.

Industry has invested large sums in "research" but in the final analysis much of this research consists largely of what are merely screening tests to determine what compounds will kill insects, and what products, for the annual crop at least, will be relatively harmless to the plants or trees to which they are applied.

The experiment station worker is in a different position. He is dealing directly with the grower who stands as a personal friend in many instances and who has depended on his judgment and advice for years. Can the experiment station worker advise his friend, the grower, that it will be perfectly safe to apply X insecticide in Y dilution on Z crop in U formulation for W pest at V temperature on R type of soil at T month in the year and have S residue at harvest, without fear of unfavorable results and with complete assurance of effective control? In our present state of knowledge he can offer no such assurance unless he has carried on trials under all the variables before mentioned in addition to replicating his experiments to assure his statistical accuracy.

If this burden is thrown on the experiment station worker the cause of plant protection will be retarded by years.

The job of the experiment station specialist should be the elucidation of the principles of toxicology the intimate knowledge of insect ecology, and the vagaries of taxonomy which often make necessary important changes in a mode of attack. It is only when the answers to these problems are available that we may have the basic facts, then *prescriptions* could be written for insecticides rather than the costly present method of empirical fumbling that masquerades as research.

Chemical Industry's Role

FEDERAL or state research units are absolutely dependent on the cooperation of the chemical industries to enable these agencies to be helpful in the clarification of the present confusion. Working with known chemicals produced by industry it is hoped that light may be shed on the modes of action of various toxicants. Each clue should then be tested with synthetic products produced by industry in the hope that basic laws and relationships may be established. One by one the different types of commercial chemicals could be fashioned to include the helpful ingredients, and the harmful constituents eliminated.

Possibilities for improvements are enormous. We would know what factors or arrangements should be included for toxic effects, what ones for penetration, how to increase or diminish residual effects and we could prophesy on the basis of the formula the prognosis for success, the most effective diluents and the best means of application.

Although the foregoing has dealt chiefly with insecticides. the statements apply equally well to fungicides and herbicides. Those who are interested primarily in the improvements of agricultural practices should work out a division of labor that will be to the ultimate benefit of agriculture.

1). Relieve the experiment stations of the interminable screening and testing of new products concerning the efficacy and safety of which accurate proof is not available.

2). Cooperate with the experiment station to establish beyond doubt the principles of toxicology, the principles of application, formulation and the removal of residues of new products, and

3). Withhold from sale products that have not been clarified under (1) above.

Concerning the problems of cooperation with the State Experi-

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What the Dealer Must Know About . . .

FERTILIZERS

by

Dr. Colin W. Whittaker
U. S. Department of Agriculture
Beltsville, Maryland

PART II

And What About Filler?

PROBABLY no word in fertilizer terminology is more widely misunderstood than "filler." It is simple to add 5 and 10 and 5 and come up with 20 percent of plant food in a 5-10-5 fertilizer. To the uninformed the next logical conclusion is that the other 80 percent is inert material or filler. Why are not fertilizers 100 percent plant food?

Nitrogen, phosphorous and potassium cannot be used as such in the manufacture of fertilizers. Nitrogen is a gas. Although several tons of it are present in the atmosphere over each acre of soil, it is of no direct value. Phosphorous and potassium are solids but both are prone to violent chemical reactions. Potassium bursts into flame when placed on water, while the yellow form of phosphorous ignites spontaneously in the air. These three elements become useful plant foods only when combined with other elements. It is thus not possible to make a fertilizer that is composed solely of the plant food elements.

Fortunately, many of the materials or compounds that the manufacturer must use as sources of the primary plant food elements also contain secondary plant foods in large amounts. Ammonium sulfate used as a source of nitrogen also contains the secondary plant food sulfur; superphosphate used to supply phosphoric acid contains both sulfur and calcium; potassium sulfate contains sulfur, sulfate of potash-magnesia contains both sulfur and magnesium; the dolomitic limestone used in some fertilizers contains both calcium and magnesium. In fact most mixed fertilizers that contain 20-30 percent plant foods, also contain 30 to 40 percent of secondary plant foods (expressed as their oxides) that are usually not shown in the guarantee. Minor plant food elements may also be present in fertilizer materials. Percentage-wise the amounts are small but only small amounts of these elements are needed or are, in fact, safe to use. Both the secondary and minor plant food elements that are present in mixed fertilizers contribute to the nutrition of the crop in situations where they are needed, although they may not be present in amounts necessary to meet the full requirements. Although these elements may be introduced into the fertilizer in an unintentional manner, they should not be considered inert material or useless filler.

Mixed fertilizers made of certain combinations of materials tend to cake in the bag or to become moist through the absorption of moisture from the atmosphere. To overcome these tendencies the manufacturer may add substances known as conditioners. Various materials are used, such as peat or other organic material. Frequently such materials contain little or no plant food but they serve a useful purpose in the fertilizer in preserving its physical condition. Amounts of such materials in excess of that required to condition the mixture (100 to 200 pounds per ton) are properly considered as filler. Amounts of dolomitic limestone or dolomite, in excess of that required to overcome the potential acidity of a mixed fertilizer, or to serve as a conditioner, should also be considered as filler. Such dolomitic limestone supplies magnesium, but the limestone can be purchased much more cheaply by itself than in a mixed fertilzer. Dolomite should not be used at all in fertilizers for use on alkaline soil or for crops thad need acid soil for best development.

To prepare a ton of 5-10-5 fertilizer, the producer must bring together materials that will supply 100 pounds of nitrogen, 200 of phosphoric acid and 100 of potash. He may then compute the amount of dolomite required to overcome the potential acidity and the necessary amount of conditioner. For this grade, and in general for all grades containing less than about 25 percent total plant food, the total amounts of plant food carriers, of dolomite and of conditioner will seldom be as much as a ton or 2000 pounds. The producer may make up the lacking poundage by adding a totally inert material as sand or by adding more than the required amounts of dolomite or conditioner. Such inert material or excess of dolomite or conditioner over requirements is properly considered as filler.

A small proportion of the filler in fertilizers is due to the requirement of whole percentages in the guarantee. It costs less to add filler than to let the nitrogen, for example, run to 5.8 percent when only 5 percent can be guaranteed, solely for the purpose of making weight. The elimination of filler is, nevertheless, desirable.

In making mixed fertilizer containing higher amounts of plant food, as a 10-16-16, the producer

is obliged to make use of the more concentrated materials, as double superphosphate in place of the ordinary kind, in order to keep the necessary mateials from adding up to more than a ton. Even in this case the total amount will seldom total to exactly a ton and some filler will still be required. In general, however, as the total amount of plant food in the mixture increases, the amount of filler per unit of plant food decreases.

High and Low Analysis

ALTHOUGH there is no definite dividing line between high and low analysis fertilizers, it may be stated that mixed fertilizers containing less than approximately 23-25 percent total plant food should be considered as low analysis while grades containing more than 26 percent are high analysis fertilizers. The terms low grade and high grade have sometimes been used to indicate the same distinction. These terms should be avoided because the former sounds derogatory and tends to suggest low quality while the latter suggests high quality. Actually either high or low analysis fertilizer may be of low or high quality depending on factors not necessarily connected with their analysis.

High analysis fertilizers are a comparatively recent development. They have been made possible through the use of more concentrated fertilizer materials, many of which have become available only in recent years. Among these are anhydrous ammonia, ammoniating solutions, ammonium nitrate, double superphosphate, and the more concentrated potash salts, such as the 60 percent muriate. About 50 percent of total plant food is the present practical limit, where the three primary plant foods are included.

Economy in High Analysis

TOTAL amounts and proper proportions of needed plant foods are what counts in crop production. Farmers should be discouraged from buying and applying simply so many *bags* of fertilizer. Consider the two grades 5-10-5 and 10-20-10. The first contains 20 percent (20 units) of total plant food while the latter contains 40 percent. To produce a given increase in crop yield might require 500 pounds of 5-10-5 but the same job can be done with only 250 pounds of the 10-20-10. If the 5-10-5 costs $50 per ton and the 10-20-10 $90 the farmer will get more from his fertilizer dollar by buying and applying half as much of the 10-20-10 as the 5-10-5. Both the dealer and farmer should understand this distinction.

Similar considerations apply to the fertilizer materials. The farmer can afford to pay about twice as much for a ton of ammonium nitrate that contains 35 percent nitrogen as for a ton of sodium nitrate that contains only 16 percent. Other examples could be cited. In the case of the nitrogen carrying fertilizer materials some consideration must be given to the different forms of nitrogen that they contain, although they are completely interchangeable for many crops.

Why does plant food tend to cost less in the high analysis fertilizers? Many items contributing to the cost of a fertilizer, as bags and bagging, tag tax, freight and delivery to the farm are based strictly on weight of the material handled without regard to the plant food content of the fertilizer. Others including profit to the broker or middleman, are stated at so much per ton. Generally speaking, such costs are lower per pound of plant food in the higher analysis fertilizers. Although materials used in high analysis fertilizer may be more costly, the net result to the farmer is usually lower-cost plant food in that type of fertilizer.

Sources of Information

DEALERS are often asked what fertilizer to use, how to use it, at what rate of application, and when. The correct answers are many and are as varied as the widely varying crop, soil and climatic conditions encountered in the many sections of the U.S. The dealer should not find it too difficult, however, to acquire general familiarity with the fertilizer problems of the community in which he does business. Seldom will the area served be more than approximately a county. Such an area will normally represent not more than a few soil types and perhaps not over half a dozen important crops. Main crops in a corn belt county, for example, may be corn, oats, weat, alfalfa, soybeans and pasture with small acreages of millet, rye, sugar beets, truck crops, and orchards. By a little study and an effort to familiarize himself with his territory and its farmer practice, the dealer can put himself in position to give accurate and helpful advice on most of the fertilizer problems of his community.

The first requirement is a good background of general information. This can be obtained by reading pertinent publications of the United States Department of Agriculture and the numerous excellent books and pamphlets published privately. Some of these are listed at the end of this article. The list is not complete and is given for the convenience of the reader who should understand that the U.S. Department of Agriculture does not necessarily endorse all opinions expressed in publications not originating in the Department. Farm periodicals carry articles giving general information and cover new developments in fertilizers and other phases of agriculture.

The best fertilizer practices are modified in most localities by local soil and crop conditions. The more general writings seldom give information that will apply in all cases. The dealer should acquaint himself with the fertilizer practices best suited to his area through the reading of publications that deal with local conditions and through consultation or corrrespondence with local authorities. The State Agricultural Experiment Stations issue bulletins and other publications that deal with problems peculiar to the crop and soil situations of the State. These can usually be had upon request. County agricultural agents, usually located in the county seat town, and extension workers are available for consultation and are usually familiar with the details of the fertilizer problems of the particular areas in which they

work. Much information can be gained through attendance at Farm Bureau and Grange meetings, by viewing demonstrations conducted by the Extension Service and through visits to the more successful farms in the community.

Special problems can be taken up with the State Agricultural Experiment Station or the United States Department of Agriculture. These agencies will send publications covering the question asked or will answer by letter or both. Publications on literally hundreds of different topics are available. In writing these agencies about special problems one should be as specific as possible. Instead of simply asking how to fertilize corn, ask, for example, how to fertilize corn in a corn-oats-legume-hay-pasture rotation on a moderately acid, slightly eroded Dekalb silt loam soil of low fertility. Give other details if they are available. Complete answers to broad general questions are frequently impossible. The person answering may do his best, but unless a specific question is asked the reply will frequently still have to be interpreted in terms of local conditions. This advice should not be restricted to dealers but passed on to farmers also.

Inquiries relating to subjects of general interest should usually go to the United States Department of Agriculture, particularly when local replies have been inadequate. Subjects might include the use of properties of single fertilizer materials as sodium nitrate, ammonium sulfate or superphosphate; how fertilizers are made; how to store fertilizers; equivalent acidity; fertilizer machinery and so on. Each year the United States Department of Agriculture is obliged to refer thousands of inquiries relating to questions of primarily local interest back to the State Experiment Station. This results in delay and frequently an extra letter. In general, State Experiment Stations or County agents can best answer questions involving soil management problems of all kinds including those relating to fertilizers. The question posed in the preceding paragraph is a typical example.

Principles of Use

CHEMICAL fertilizers are used to supplement natural sources of plant food, or plant nutrients, such as the reserves in the soil and plant foods returned to the soil in crop residues, farm manures and composts. The fertilizer program of any farm should be an integrated part of other sound soil conservation and management practices. Thus the proper use of fertilizer will depend on the native soil fertility, previous soil management, crops to be grown, the amount of farm manure available, and other factors. Maintenance of soil fertility should be given even more consideration than the returns expected from any single crop.

The kind and amount of fertilizer to apply is best judged by

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TABLE 2. FERTILIZER CONTROL OFFICIALS

State	Official	State
Alabama*	Commissioner of Agriculture and Industries	Montgomery
Arizona	State Chemist	Tucson
Arkansas	Commission of Revenue	Little Rock
California*	Director, Department of Agriculture	Sacramento
Coloraado*	Director of Agriculture	Denver
Connecticut	Director, Connecticut (State) Agricultural Experiment Station	New Haven
Delaware*	Secretary, State Board of Agriculture	Dover
Florida*	Commissioner of Agriculture	Tallahassee
Georgia	Commissioner of Agriculture	Atlanta
Idaho	Commissioner of Agriculture	Moscow
Illinois	Superintendent, Division of Foods and Dairies	Chicago
Indiana	State Chemist, Agricultural Experiment Station	La Fayette
Iowa*	Secretary, Department of Agriculture	Des Moines
Kansas	Secretary, State Board of Agriculture	Topeka
Kentucky	Director, Agricultural Experiment Station	Lexington
Louisiana	Commissioner, Department of Agriculture and Immigration	Baton Rouge
Maine*	Commission of Agriculture	Augusta
Maryland*	President and Executive Officer, State Board of Agriculture	College Park
Massachusetts*	Official Chemist, Experiment Station	Amherst
Michigan*	Commissioner of Agriculture	Lansing
Minnesota†	Commissioner, Department of Agriculture, Dairy and Food	St. Paul
Mississippi	Commissioner, Department of Agriculture and Commerce	Jackson
Missouri	Director, Agricultural Experiment Station	Columbia
Montana*	Commissioner of Agriculture Labor, and Industry	Helena
Nebraska	Director, Department of Agriculture and Inspection	Lincoln
New Hampshire	Commissioner of Agriculture	Concord
New Jersey*	State Chemist	New Brunswick
New Mexico	Deputy in Charge, New Mexico Feed and Fertilizer Control Office	State College
New York*	Commission of Agriculture and Markets	Albany
North Carolina*	Commissioner of Agriculture	Raleigh
North Dakota	Commissioner, State Food Commission	Bismarck
Ohio*	Director of Agriculture	Columbus
Oklahoma	Chief Inspector, State Board of Agriculture	Oklahoma City
Oregon*		Salem
Pennsylvania*	Secretary of Agriculture	Harrisburg
Puerto Rico	Commissioner of Agriculture and Commerce	Rio Piedras
Rhode Island*	Director, Department of Agriculture and Conservation	Providence
South Carolina	Secretary, Board of Fertilizer Control	Clemson College
South Dakota	Director of Inspection, Department of Agriculture	Pierre
Tennessee	Commissioner of Agriculture	Nashville
Texas	State Chemist and Chief, Division of Chemistry, Agricultural Experiment Sta.	College Station
Utah	Commissioner, State Board of Agriculture	Salt Lake City
Vermont*	Director, Agricultural Experiment Station	Burlington
Virginia*	Commissioner of Agriculture and Immigration	Richmond
Washington*	Director of Agriculture	Olympia
West Virginia*	Commissioner of Agriculture	Charleston
Wisconsin*	Director, Department of Agriculture	Madison
Wyoming	State Chemist	Laramie

* These states also have laws regulating the sale of liming materials that are enforced by the same officials.
† Mineral mixtures containing calcium carbonate must show guarantee for calcium.

Beef Cattle Freed of Lice in One Treatment Control

CONTROL of lice on range and feeder cattle as an established livestock - management practice is generally recognized not only as a necessity for preventing economic loss to the breeder and feeder but also as a profitable operation for increasing beef production at all times and particularly during the present period of critical meat shortage. A number of insecticidal materials are effective to a greater or lesser degree against cattle lice. Relative effectiveness is judged by the number of applications required, by the period of protection, and by the weight gains and improvement in general condition of the treated animals. Granting equal effectiveness from those points of view, there is still the requirement that materials used should be free from any hazards to animals or operators even if carelessly or incorrectly used, and that there should be no possibility of the contamination of meat, meat products or milk through skin absorption of the insecticidal chemicals.

The most significant cost in treating beef cattle for control of lice, or in any other operation involving moving, holding, trailing, and handling the animals, is the value of weight lost and the normal gains prevented during and subsequent to such operations. The value of the weight lost and gains prevented is greater than all other factors combined in control practices, and exceeds the total cost of labor, materials, and equipment. A one-treatment or single-application insecticide, particularly when combined with freedom of toxicological hazards, that will provide practical cattle-louse control throughout the winter season represents enormous advantages in economy and convience plus weight and condition gains.

The effectiveness of combinations of piperonyl butoxide and pyrethrum against biting and sucking lice on livestock was demonstrated in small-scale experiments 1946 and 1947. The results of these single-application treatments were so completely effective that extensive field experiments were undertaken during the fall and winter of 1947-1948. The purpose of this paper is to report the results of these field experiments involving the treatment of over 5000 cattle in five western states. A number of formulations and combinations were included in the tests to provide information on relative effectiveness but a large proportion of the treatments represented minor modifications of a formulation found to be effective in the earlier experiments.

Tests were carried on in Arizona, Colorado, Montana, New Mexico, Oklahoma, and Wyoming during the period of heaviest louse populations, November 1947 to June 1948, under the immediate supervision of competent investigators, exceptionally experienced in experimental and practical livestock parasite control. These men were thoroughly familiar with methods and techniques used in field tests on animals and were unusually well qualified to evaluate the results from an experimental standpoint, and from the viewpoint of practical control measures.

Experimental Animals

WITH the exception of one small dairy herd, test applications were made to beef type cattle. These represented purebred and grade breeding herds, range stock and feeder animals, and included all age groups and both sexes. All individuals were normally or exceptionally heavy haired, and had attained the typical hair coat condition common to beef animals during the winter in the Rocky mountain area.

Table 1 summarizes number of herds involved, breeds of cattle, individual animals treated and method of application. Treatments were made to 47 separate bunches of cattle, involving 5494 individual animals.

Most of the herds were Herefords. A total of 4309 head received insecticide application by power sprayer, while 1078 were dipped in conventional vats.

Louse Species

IN many of the tests, attention was given only to the short nosed ox louse, *Haematopinus eurysternus* (Nitzsch). This species predominated in every experimental herd treated and was the only louse considered in the applications in Montana, Wyoming,

by

B. Thomas Snipes*
U. S. Industrial Chemicals, Inc.

Colorado, northern New Mexico and northwestern Okaloma. Specimens of the long nosed louse, *Linognathus vituli* (Linne'), were observed in a number of treatments but their numbers and economic importance were insignificant in comparison with infestations of the short nosed louse. Although infestations of the latter species predominated on northern Arizona cattle, the long nosed sucking louse and the cutter or little red biting louse, *Bovicola bovis* (Linne'), were also present in appreciable numbers.

Where differentiation of results between species was unimportant, impracticable, or inconvenient, control was evaluated on the basis of the presence or absence of lice as such, without specific designation.

Method of Application

IN all cases test materials were applied under practical field conditions, using methods and equipment commonly employed for the large-scale treatment of beef cattle for control of lice.

A dust preparation was used on a relatively small number of animals, applied by hand dust gun during periods of freezing or sub-zero weather. Dosage in hand dusting averaged approximately 6 ounces of material per head.

The commercial "Spray-Dip" machine was used in one of the Montana tests, with an average application of two gallons per animal. Dipping treatments were made in conventional slide-board, swim-type vats of 2800 and 3200 gallon capacities, equipped with double drain pens. Average solution retention per animal in vat dipping was 1 gallon.

The application of insecticides to range and feeder cattle by spray machine is fast increasing in usage and popularity among ranchers, cattlemen, and livestock feeders. Power sprayers employed in these field experiments were of the high-pressure, orchard type, truck or trailer mounted, self-powered and equipped with 150 gallon tank or larger, mechanical agitator, pump capacity of at least 10—12 GPM, and two or more separate cutoff high-pressure hose lines. Various guns were used, but most treatments were made with 3 or 4 nozzle hand booms (with Nos. 3 or 4 discharge discs), or with adjustable single nozzle trigger guns with Nos. 3 to 5 discs. Pump gauge pressure was usually maintained at 400 psi., with multiple or single nozzle applicators adjusted to give a driving, penetrating cone shaped spray pattern. An attempt was made to obtain complete coverage of all body portions and to wet the animal thoroughly. Spray dosage varied between ¾ and 3 gallons per head, depending on the spray gun operator, pen and corral facilities, and the size of the cattle. Average application in the majority of tests, however, is computed at approxi-

Above: Hereford cow heavily infested with short-nosed ox louse. Infestations such as this cause severe losses in weight. (Photo by S. W. Clark).

* It is a pleasure for the author to acknowledge with thanks the splendid cooperation received from the following men:

J. C. Armer, Navajo County Agricultural Agent, Holbrook, Arizona; Stephen L. Brock, Harlan-Brock Ranch, Roy, New Mexico; Arthur Behimer, rancher and custom spray operator, Kenton, Okla.; E. H. Brown, Texas Gulf Sulphur Company, Phoenix, Ariz.; Roy S. Cooper, County Pest Inspector, Sheridan, Wyo.; J. S. Edwards, County Pest Inspector, Powell, Wyo.; O.B. Hitchcock, Ass't. State Entomologist, Montana State College, Bozeman, Mont.; Dr. J. N. Roney, Extension Entomologist, Phoenix, Arizona; Donald Scharf, Ass't. Entomologist Agric. Exp. Sta., Montana State College, Bozeman, Mont.; C. E. Titensor, Ass't. Extension Entomologist, Worland, Wyo.; and J. H. Tully, County Pest Inspector, Worland, Wyo.

TABLE 1
Experimental Animals and Method of Application.

	Power Sprayer		Dipping Vat		Hand Duster		Total	
Breed	Herds	Animals	Herds	Animals	Herds	Animals	Herds	Animals
Holstein	1	26					1	26
Shorthorn	2	70					2	70
Hereford	36	4213*	3	1078	5	107	44	5398
Total	39	4309	3	1078	5	107	47	5494

* Includes 23 head treated by "Spray-Dip" machine.

mately 1 gallon of material per head.

Experimental Preparations Tested: Test materials were all based on combinations of piperonyl butoxide with pyrethrins in an ingredient ratio of 20 to 1. Basic formulations, in addition to variations in diluted concentrations, were also used in conjunction with additional materials including wettable sulfur, rotenone (cube' powder), wettable DDT and emulsifiable DDT. Basic preparations and the concentrations and combinations in which they were applied, are listed as follows:

No. 1. Dust: 0.50% piperonyl butoxide, 0.025% pyrethrins and 0.20% rotenone in sulfur carrier.

No. 2. T-194 Wettable Powder (10% piperonyl butoxide with 0.5% pyrethrins) @ 1 lb. per 100 gals., with 1 lb. 50% wettable DDT. 12 mg. butoxide, 0.6 mg. pyrethrins and 60 mg. DDT per 100 cc.

No. 3. T-194 Wettable Powder @ 1 lb. per 100 gals., with 1 lb. 50% wettable DDT, and 1 lb. wettable sulfur: 12 mg. butoxide, 0.6 mg. pyrethrins and 60 mg. DDT.

No. 4. T-194 Wettable Powder @ 1 lb. per 100 gals. with 5 pints of 35% emulsifiable DDT: 12 mg. butoxide, 0.6 mg. pyrethrins and 250 mg. DDT.

No. 5. T-130 Wettable Powder (12.5% DDT, 2.0% piperonyl butoxide and 0.20% pyrethrins) @ 8 lbs.per 100 gals.: 125 mg. DDT, 20 mg. butoxide and 2 mg. pyrethrins.

No. 6. T-194 Wettable Powder @ 4 lbs. per 100 gals: 47.6 mg. butoxide and 2.4 mg. pyrethrins.

No. 7. T-194 Wettable Powder @ 6 lbs. per 100 gals.: with 6 lbs. wettable sulfur. 71 mg. butoxide and 3.5 mg. pyrethrins.

No. 8. T-194 Wettable Powder @ 8.4 lbs. per 100 gals.: 100 mg. butoxide and 5 mg. pyrethrins.

No. 9. T-194 Wettable Powder @ 9.33 lbs. per 100 gals.: 113 mg. butoxide and 5.6 mg. pyrethrins.

No. 10. T-194 Wettable Powder @ 8.4 lbs. per 100 gals.: with 5 lbs. 5% cube powder, for combined lice and cattle grub control: 100 mg. butoxide, 5 mg. pyrethrins and 30 mg. rotenone.

No. 11. T-150 or T-234 Emulsifiable Concentrate (40 g. piperonyl butoxide with 2 g. pyrethrins per 100 ml) @ 1 to 400: 100 mg. butoxide and 5 mg. pyrethrins.

No. 12. T-284 @ 1 to 400, with 5 lbs. 5% cube powder per 100 gals. for combined louse and grub control: 100 mg. butoxide, 5 mg. pyrethrins and 30 mg. rotenone.

No. 13. T-195 Emulsifiable Concentrate (10 g. piperonyl butoxide with 0.5 g. pyrethrins per 100 ml) @ 1 to 100: 100 mg. butoxide and 5 mg. pyrethrins.

No. 14. T-195 Emulsifiable Concentrate @ 1 to 128: 78 mg. butoxide and 3.9 mg. pyrethrins.

Although effective minimum concentration was an important consideration, practical seasonal louse control with a single application was the primary experimental objective in many of the tests, and a large number of applications was made with final ingredient concentrations approximating 100 mg. piperonyl butoxide and 5 mg. pyrethrins per 100 cc.

Evaluation of Control

EXPERIMENTAL herds were selected on the basis of exceptional lousiness, for the purpose of making the practical field tests as critical and as acute as possible. In most cases, an unusually large percentage of typical louse "carriers" was involved. One entire bunch of 100 head was composed of "carriers" selected from a range herd of over 3000 animals.

In all cases, treated herds or representative individuals were closely examined by the respective investigator at varying intervals after application. Checks of such animals were usually made within 5 days following treatment, at least once during the normal egg incubation period, within a few days after expiration of this period, and at several weeks following application. Data obtained was supplemented to a considerable extent by the observations and examinations of the respective herd owners.

Two principal considerations were determined as basis for the evaluation of results. The first of these were initial control of motile louse stages present at the time of

Below: (L to R) Purebred and grade Hereford breeding and range cattle brought in for louse control treatment with "Pyrenone." (TE Ranch, Cody, Wyo.). Second photo: Power spraying with rotenone for cattle grub control in a long chute equipped with catwalk. Diamond Bar Ranch, Cody, Wyo. (Photo by J. N. Nicholls).

insecticide application. Examinations for determination of initial kills were made 5 to 14 days after treatment and, consequently, involved not only the degree of kill of motile lice present on the date of application, but also some residual action during the intervening period.

Most of the experimental interest in these tests was directed toward practical control of cattle lice throughout the season of most severe infestation, as a result of a single insecticide application. Practical seasonal control involved a very high percentage of initial kill and, more important, sufficient residual action during the subsequent incubation period to reduce louse populations to a non-injurious or non-economic level.

Louse Control Results

TABLE 2 summarizes results obtained in cattle louse control with various concentrations of piperonyl butoxide-pyrethrins combinations on 47 herds of cattle totaling 5494 aniamls. Louse control is evaluated in terms of initial kill of motile stages as determined by checks made 5 to 14 days after treatment, while residual effectiveness is indicated by the interval between application and the appearance of motile stages on check animals. The presence of a single louse on any test animal was the basis for terminating the louse-free period for the entire herd under observation.

Practical seasonal louse control is given in terms of days to economic reinfestation. In most cases, periodic observations were discontinued after continued freedom from lice was recorded for any appreciable length of time, and the period of practical control obtained is evidently much longer than indicated.

Dry application of 5 to 7 ounces of a dust containing 0.5% piperonyl butoxide, 0.05% pyrethrins and 0.20% rotenone, in sulfur, were very effective for the control of short nosed ox louse on beef cattle. Initial results were quite slow, with only 40% reduction in motile populations during the first 10 days. Ultimate action was apparently complete, however, with practical louse clean-up reported in 30 days and seasonal control in excess of 4 months.

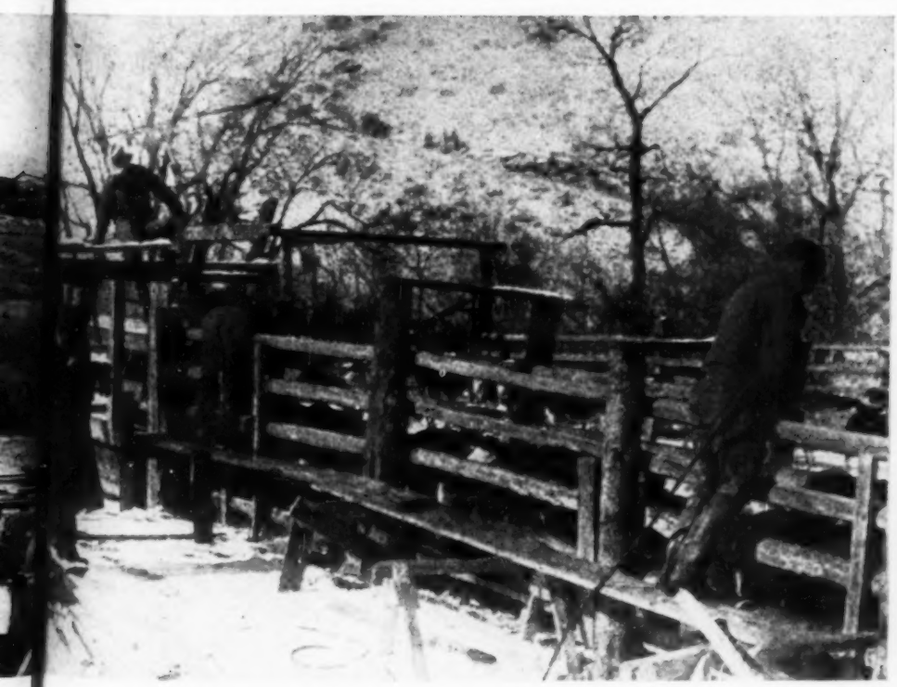
No ineffective concentrations of piperonyl butoxide with pyrethrins were used in these tests, and the lower limit of initial effectiveness is consequently not indicated. Louse infestation reductions of over 90% were recorded from all applications, with initial kills approximately 100%. Residual action, however, appears to be definitely correlated with concentration. Results are somewhat variable with the method of application and the area concerned, but practical seasonal control of sucking lice on beef cattle from a single application would appear to require a minimum of 75 mg. of piperonyl butoxide with 3.75 mg. pyrethrins per 100 ml. of spray or dip.

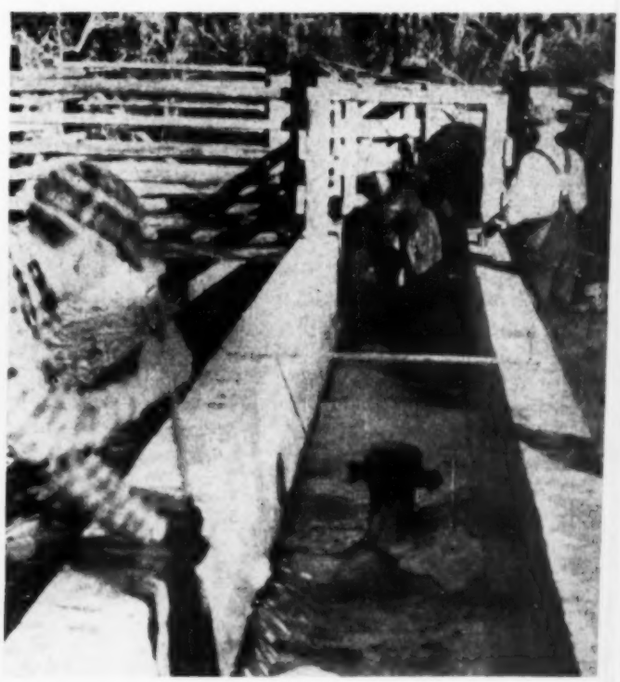
Concentrations as low as 12 mg. butoxide and 0.6 mg. pyrethrins, with 0.06 DDT, gave complete initial kill, with louse reappearance at 3 and 4 weeks, and practical seasonal control for periods of 2 and 3 months. When DDT content was increased to 0.25%, seasonal control was extended to more than 4 months.

There is some indication that the effectiveness of low concentrations of "Pyrenones"* may be increased by the addition of sulfur. Complete initial kills obtained with higher concentrations with and without sulfur did not allow for determination of possible increase in effectiveness attributable to the presence of this material. In one comparative test, residual action of a reduced "Pyrenone" concentration apparently was not prolonged by the addition of sulfur.

In all cases where biting lice

Below: (L to R) Power spraying with rotenone-sulfur for cattle grub control in sub-zero weather near Sheridan, Wyo. (Photo by S. W. Clark). Second photo: Dipping cattle in the standard swim vat, using rotenone-sulfur for cattle control. Photo taken in Sheridan County, Wyo.; courtesy of Roy S. Cooper.





* U. S. Industrial Chemicals, Inc., registered trademark indicating a combination of piperonyl butoxide with pyrethrins.

were present in sufficient numbers to permit specific evaluation of results, a single application of a given "Pyrenone" concentration gave apparent elimination of this species.

Relatively high infestations of the cutter louse on three herds in Arizona disappeared from all animals immediately following power spray applications of piperonyl butoxide-pyrethrins wettable powder or emulsifiable concentrate, and no specimens of this louse were found on test animals 5, 14, 26, 30 and 60 days after treatment.

A very effective preparation for combined control of cattle lice and cattle grubs by high-pressure spraying results from the addition of rotenone to "Pyrenone" formulations. A spray containing 100 mg. piperonyl butoxide, 5 mg. pyrethrins, and 30 mg. rotenone, not only gave the expected high grub kill, but consistently resulted in complete kill of lice, as well as in practical louse control throughout the post-treatment observation periods (65 to 150 days).

No greatly significant difference in residual effectiveness was evident between equal concentrations of wettable powders and emulsifiable concentrates. It is indicated, however, that the emulsions are somewhat more rapid in initial action and may give slightly more effective residual deposits. One investigator remarks some possibility of ovicidal properties in the case of "Pyrenone" emulsions, but it is thought that practical control obtained is chiefly attributable to effective residual action.

One series of weight gain tests yielded some remarkable data on the economic benefits accruable from the control of lice on range cattle. During the period of heaviest louse infestation, a lot of treated cows made an average gain of 83-½ lbs. per head. Untreated check animals averaged only 10-½ lbs., a net gain per head of 73 pounds attributable to effective louse control by a single treatment with butoxide-pyrethrins power spray.

As a supplement to cattle louse control tests in Arizona, Dr. Roney and Mr. Armer had occasion to experiment with a concentration of 400 mg. piperonyl butoxide and 20 mg. pyrethrins against spinose ear tick, *Otobius magnini* (Duges). Nine Hereford yearlings carrying 10 to 15 ticks per ear were treated by individual applications of small amounts of the emulsion. On examination 15 days after treatment, 17 ears were completely tick free while one animal showed a single tick.

Summary and Conclusions

1. Comparative weight gain tests conclusively demonstrated the economic benefits of effective louse control with "Pyrenones"

TABLE 2. Cattle Louse Control Resultant From Single Treatments With Piperonyl Butoxide-Pyrethrins Combinations. (Results in terms of Short Nosed Ox Louse).

Formulation Number	Concentration (Mg./100 Ml.) Piperonyl Butoxide	Pyrethrins	Rotenone	DDT	Method of Application	Dosage per Head	Number of Animals	Initial Louse Kill (5-14 da.)	First Evidence of Louse Reappearance	Length of Practical Louse Control Period
1	.5(%)	.025%	.2%		Hand Dust	6 oz	107	40% 10 da. 100% 30 "	None @ 125 days	Over 125 days[1]
2	12 mg.	0.6 mg.		60	Power Spray	1 gal	100	100%	21 "	" 60 " [1]
3	12	0.6		60	" "	1 "	100	100%	30 "	" 90 " [1]
4	12	0.6		250	" "	1 "	125	100%	" 120 "	" 120 " [1]
5	20	2		125	" "	2 "	23	90%	70 "	" 70 " [1]
6	47.6	2.4			" "	1 "	183	100%	22 "	" 45 " [1]
6	47.6	2.4			" "	1 "	165	100%	25 "	" 60 " [1]
7	72	3.5			" "	¾ "	99	100%	26 "	60 " [2]
8	100	5			" "	¾ "	44	100%	26 "	60 " [2]
8	100	5			" "	2 "	31	100%	71 "[3]	" 100 " [1]
8	100	5			" "	1 "	86	100%	" 100 "	" 100 " [1]
8	100	5			Dip	1 "	183	100%	" 45 "	" 100 " [1]
9	113	5.6			Dip	1 "	592	100%	90 "	" 107 " [1]
10	100	5	30		Power Spray	1 gal	104	100%	" 65 "	" 64 " [1]
10	100	5	30		" "	1 "	40	100%	" 100 "	" 100 " [1]
11	100	5			" "	¾ "	65	100%	75 "	" 75 " [2]
11	100	5			" "	1 "	224	100%	" 60 "	" 60 " [1]
11	100	5			" "	1 "	25	100%	" 165 "	" 165 " [1]
11	100	5			" "	1 "	11	100%	" 90 "	" 90 " [1]
11	100	5			" "	1.7 "	104	100%	" 100 "	" 100 " [1]
11	100	5			" "	1.5 "	100[4]	100%	45 "[5]	" 75 " [1]
11	100	5			" "	1.5 "	250	100%	" 90 "	" 90 " [1]
11	100	5			" "	1.5 "	700	100%	60 "	" 75 " [1]
11	100	5			" "	1 "	825	100%	45 "[5]	" 90 " [1]
11	100	5			" "	1 "	463	100%	" 35 "	" 120 " [1]
11	100	5			" "	1 "	157	100%	" 60 "	" 100 " [1]
11	100	5			Dip	1 "	303	100%	" 62 "	" 100 " [1]
12	100	5	30		Power Spray	1 "	79	100%	" 75 "	" 75 " [1]
12	100	5	30		" "	1 "	68	100%	" 150 "	" 150 " [1]
12	100	5	30		" "	1 "	50	100%	" 120 "	" 120 " [1]
13	100	5			"Spray Dip"	2 "	26	99%	28 "	" 100 " [1]
13	100	5			Power Spray	2 "	23	100%	60 "	" 60 " [1]
14	78	5			" "	2 "	39	100%	" 60 "	" 60 " [1]

[1] Observations discontinued after this interval
[2] Biting lice infestations eliminated
[3] Two lice found, one each on 2 of 17 head examined
[4] This herd composed entirely of typical louse "carriers"
[5] One animal not louse-free

Former Presidents of Association Honored at Fifteenth Annual

A. I. F. Meeting

LEA S. HITCHNER
AIF Executive Secretary & Treasurer

THE 15th annual meeting of the Agricultural Insecticide & Fungicide Association was scheduled to be held on September 7, 8 and 9, at the Essex and Sussex Hotel, Spring Lake, N. J. Speakers representing State Agricultural Experiment Stations, the Cotton Council of America, the chemical manufacturing industry, and U.S. Department of Agriculture were to appear on the program which was scheduled to open on Wednesday with a talk by Dr. Stanley B. Freeborn, assistant Dean, University of California College of Agriculture, Berkeley. His subject was "The Role of the Agricultural Experiment Station in Insecticide, Fungicide and Herbicide Research. (see pages 24, 25 and 26)

The first day of the meeting was to include only a noon meeting of the Association's Membership and Information Committee, and an afternoon session of the Technical Committee. Movies were to be shown Tuesday evening, preceding a meeting of the Legislative Committee and the board of directors.

Claude L. Welch, director, division of Cotton Production and Marketing, National Cotton Council, of America, Memphis, Tenn, and J. V. Vernon, vice-president, Niagara Chemical Division, Food Machinery Corp., Middleport, N. Y. were scheduled for talks on Wednesday; and a "Legislative Round-table" was also arranged for the morning session. At this latter gathering, three men were to lead the discussion. These were Dr. E. L. Griffin, assistant chief, Insecticide Division, Production and Marketing Administration, U.S.D.A., Washington; Dr. A. B. Heagy, secretary-treasurer, Association of Economic Poisons Control Officials, College Park, Md.; and Dr. Charles L. Smith, technical advisor, A.I.F. Association, New York.

Full Report to be in October Issue

A full report of the 15th annual A. I. F. meeting will be carried in the October issue of Agricultural Chemicals.

Abstracts of most of the papers given at the meeting, a resume of both social and business nature, and photos of speakers and attendants will be included in the story.

Copies of the October issue will be sent to the complete list of those who register at the Spring Lake meeting.

Golf and other sporting events were planned for Wednesday afternoon, with the 15th annual A.I.F.A. banquet being held in the evening. Golf awards and other prizes were to be presented at the dinner session. A unique feature of this period was to be the presence of all the former presidents of the Association. These were to include Lea S. Hitchner, now executive secretary and treasurer; Warren H. Moyer, vice-president, Chipman Chemical Co., Inc., Bound Brook, N. J.; Joseph B. Cary, executive vice-president, Food Machinery Corp., San Jose, Calif.; and George F. Leonard, present president. Although not a former president, Ralph N. Chipman was to be included in this honored group since he was a charter member of the Association and was one of the original signers of the incorporation papers.

The final day of the meeting was to be opened by president Leonard, with additional reports by A.I.F.A. committees following. S. A. Rohwer, assistant chief Bureau of Entomology and Plant Quarantine, U.S.D.A., and president of the American Association of Economic Entomologists, was scheduled to speak. Eugene Butler, editor of *Progressive Farmer*, Dallas, Texas; and Paul S. Willis, president, Grocery Manufactures of America, Inc. were on the program for Thursday. "Products Liability" was the subject of a forum scheduled for Thursday morning, with speakers including A. W. Rinke, A.I.F.A. counsel; T. J. McDowell, Sherwin-Williams Co.; and W. B. DeRiemer, E. I. duPont de Nemours & Co., Inc. Ray Smethurst, general counsel, National Association of Manufacturers, Washington, was on the program as final speaker of the meeting.

The meeting was to end with an informal discussion of new insecticides . . . for Association members only . . . and a meeting of the newly-elected board of directors.

Protecting Canada's Stored Grain by

CHEMICAL CONTROLS

PART I

GRAIN growing is one of the mainstays of the Canadian economy. In spite of the industrial development of the past ten years, the export of grain and cereal products still continues to be one of the major factors in Canadian world trade. Products of this type are of course subject to insect infestation and the purpose of this article is to outline some of these problems and the way in which they have been solved.

In peace times in Canada, with a normal flow of grain from the producer to the ultimate consumer, insect problems in connection with grain storage are almost non-existent. As a result of the war, much of the normal outlet for Canadian grain was shut off in Europe and it was necessary to store enormous quantities. Bountiful crops added to the extent of the grain surplus which at times vastly exceeded the total storage facilities.

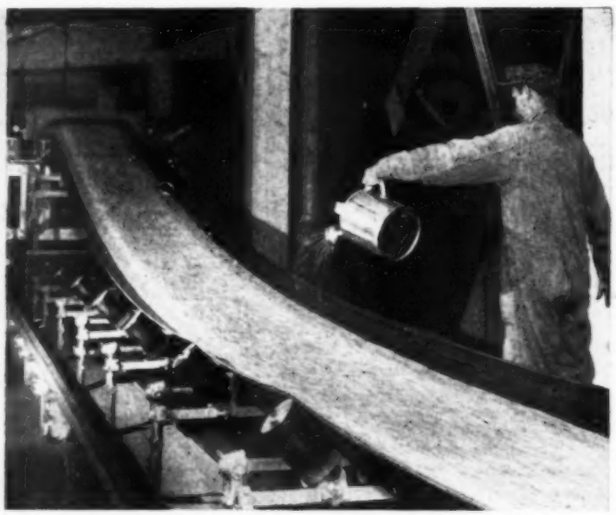
Almost all of Canada's export grain is grown in the three Prairie Provinces of Manitoba, Saskatchewan, and Alberta. In the case of wheat, hard spring types predominate, with a small precentage of Durum and winter wheat being grown. Large quantities of oats and barley and small amounts of rye and flax are also produced.

As a grain exporting nation, Canada is naturally interested in having the product reach the customer in the best possible condition. This is essential for Canada to retain its present position in the export market.

Wheat is grown in Western Canada because it is one of the few crops that can be grown successfully there. Its moisture requirements are lower than those of the coarser grains. In this area grain growing is an extensive type of agriculture. For the most part the operations use tractors for power. Combines have largely replaced the binder and threshing machine and in many cases the grain is hauled by truck directly from the field to the country elevator.

To contribute food to the Allies during the war, it was not only necessary to produce large quantities of grain but it was equally important to store this material and maintain it in good condition for shipment overseas when space became available.

The major problem in storage is to keep the grain dry. While the normal precipitation on the prairies is not high, the winters are comparatively long, accompanied by considerable snowfall. Beginning in April, the rainfall may amount to three or four inches per month in a normal season and the grain must be protected from this moisture. When grain is free from excess moisture at



Below (L to R) Taking probe samples in grain bin to determine presence of insect pests. (R): Applying fumigant to the grain stream just in front of the tripper.

Using the electric sprayer in grain bin to control Indian meal moth.

the time of harvest, and is harvested under dry conditions, it can be successfully stored for two years or more. However, due to the short growing season, "combining" is often carried out before crops are fully mature, or threshing is done in wet fall weather so that grain goes into storage with an excess of moisture. Even mature grain placed in storage in a uniformly dry condition is subject to local translocation of moisture in response to the strong temperature differential set up in any considerable bulk of grain during severe winters. Excess moisture accelerates insect problems.

Commercial Storages

THE Canadian pre-war grain handling facilities for the storage of grain had a total capacity of some 452 million bushels, in country elevators, mill and private elevators, terminal elevators and lake boats.

Country Elevators

COUNTRY elevators are scattered throughout the prairie wheat growing area. They receive grain from the growers, weigh and bin it according to grade, then ship it by rail to terminal points when carloads of any particular grade are accumulated.

Inspectors of the Board of Grain Commissioners examine it enroute and an official grade is given to the individual lot. Unless protested, this grade becomes final as long as the condition of the grain remains unchanged.

To augment the storage at country elevators, quite a large number of temporary structures called annexes were built during 1939 and 1940. They have a capacity of 26,000 to 30,000 bushels. In a few cases larger structures were built. Other types, similar to a farm silo, were also used. The capacity of these was about 5,000 bushels.

Such annexes were usually built close to the country elevators, in some cases several being located around a single elevator. The grain was spouted from the distribution head of the elevator to the filling holes in the roof of the annex.

In addition to these facilities, grain at country points was stored in warehouses, churches, lumber yards, and other available structures. In some cases these were not on trackage which made both loading and unloading relatively expensive.

"Distress storages" in connection with terminal elevators, resembled the annexes but were much larger, varying from 200,000 to 5,000,000 bushels capacity. Grain was conveyed from the elevator by a belt and transferred to the distress storage belt. A movable plough distributed the grain and discharged it at the point desired. Unloading was via a central tunnel belt handling from 10,000 to 18,000 bushels per hour, with gravity feed removing about 60 per cent of the grain.

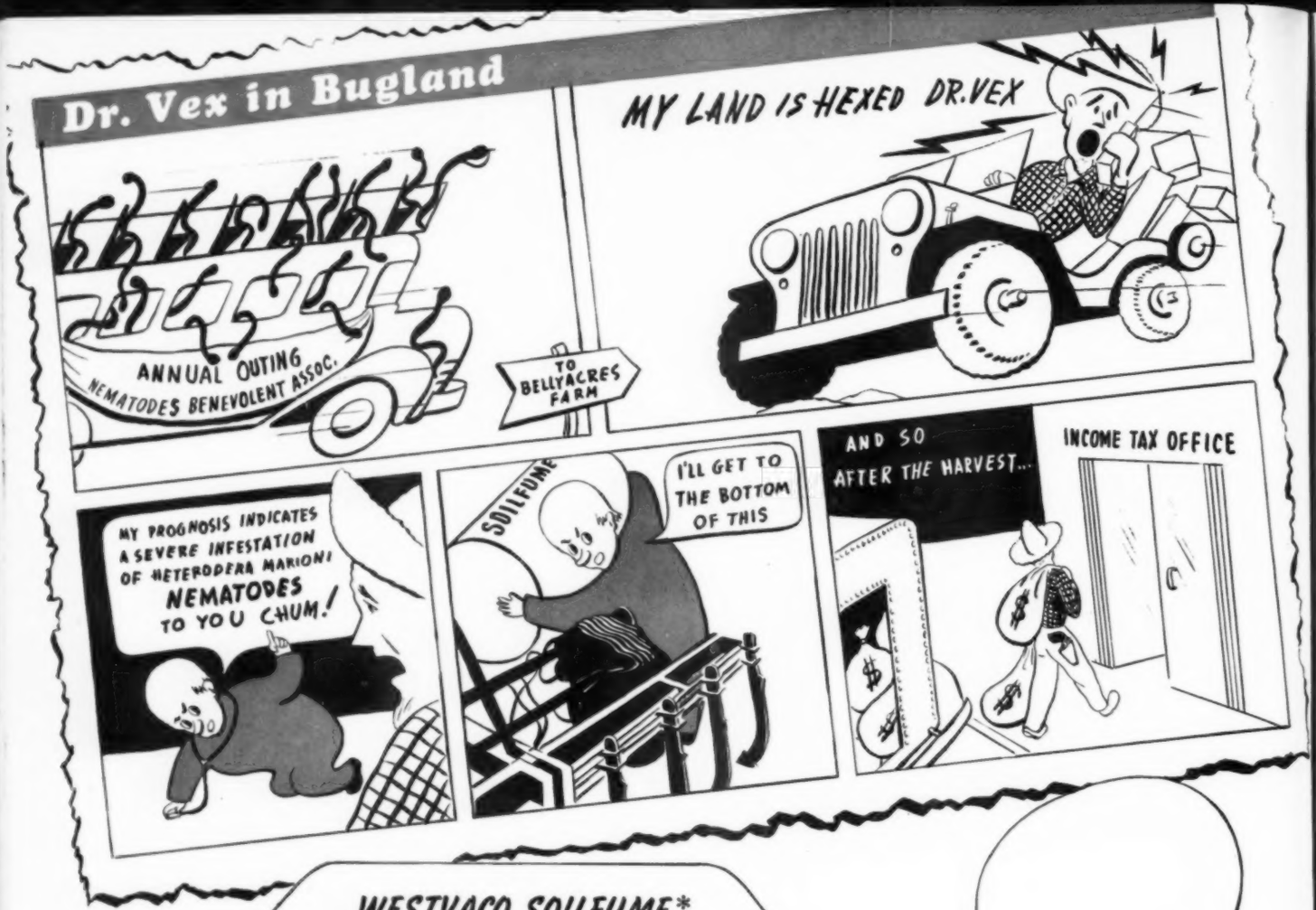
Farm Storage

FARMS in Western Canada have storage for approximately 860 million bushels of grain. This consists of outside granaries and bins in barns. The outside granaries in most cases vary from 500 to 5,000 bushels. The shortage of farm storage space made it necessary to leave some grain outside in piles. Careful farmers chose high, dry locations, dug a drainage ditch around the selected area, and protected the pile with water proof paper.

Entomological Setup

THE overall insect control program in Canada has been possible through the co-operation of three government agencies:

1. The Board of Grain Commissioners, Department of Trade and Commerce, 2. The Division of Entomology, Dominion Department of Agriculture, and 3. The Division of



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SOILFUME*, for instance, is being widely used to control nematodes, wireworms and other soil-borne pests. Mixers and dealers in truck-crop areas will find interesting data on the use of SOILFUME in the free booklet offered below. Write for your copy today.

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Benzene Hexachloride Technical—for oil emulsions, wettable and dry dust dispersions
Benzene Hexachloride Concentrates—wettable and dry dust (6% and 9% gamma isomer) concentrates
DDT Technical—for oil emulsions, wettable and dry dust dispersions
DDT Concentrates—wettable and dry dust concentrates
Tetraethyl Pyrophosphate (Fosvex)*
Methyl Bromide
Grain Fumigants
Soil Fumigants
3-5-40 Cotton Dust

Plant Protection, Dominion Department of Agriculture.

The Board of Grain Commissioners regulates the handling and marketing of grain in Canada. It has jurisdiction over the inspection and weighing of grain, registration of warehouse receipts, licensing and bonding of persons in the grain trade, tariffs of grain handling and storage of grain, public storage of grain, compilation of official grain statistics, grain research, investigation and settling of disputes in the grain trade and regulation of grain car distribution.

The Stored Product Insects Unit of the Division of Entomology has charge of the investigational work in connection with the storage pests of grain and other commodities. Officers of this service act as advisors to the Board of Grain Commissioners in connection with insect control and supervise much of the control work.

The Division of Plant Protection is an inspection service, the personnel of which carry out the actual inspection of both lake and ocean-going boats as well as the examination of elevators, warehouses, etc. Close contact is maintained with the Division of Entomology in connection with all phases of the work which the inspection service does.

Methods of Operation

THERE are no "weevilly" grades in connection with Canadian export grain. Consequently, when elevator operators encounter insect pests in grain they communicate with the Board of Grain Commissioners. All treatment of grain for the control of insect pests must be carried out under the supervision of the Board of Grain Commissioners, employing authorized materials. In practice, most of the entomological supervision is carried out by officers of the Stored Product Insects Unit of the Division of Entomology, while the re-establishment of official grade on the treated grain is carried out by the grain inspection department of the Board of Grain Commissioners.

Shortly after the outbreak of war, it was realized that a serious storage problem with grain was imminent. The scientific personnel of the Division of Entomology assigned to this subject was small and it was not possible to increase it because of enlistments in the armed forces and the increased demands in other fields of entomology.

In 1941 an entomologist, Dr. B. N. Smallman, was employed by the Board of Grain Commissioners and seconded to the Division of Entomology to carry out investigations in connection with the phases of grain storage which came directly under the jurisdiction of the Board. Laboratory facilities and as assistant were provided in the Grain Research Laboratory at Winnipeg. In 1942 Mr. D. J. Petty was loaned by the Division of Plant Protection and stationed at Fort William to assist with the storage problems at that point.

With the limited technical staff available, complete co-operation of the various grain companies was secured to secure information and to assist in the control phases of the program.

All of the companies instructed their elevator agents to forward samples promptly whenever pests were found in grain. The samples were examined in the laboratory and the companies were given specific information regarding the pests present in the samples. Approximately 5,000 samples were examined per year to provide a large amount of data on the pests of stored grain in the Dominion of Canada.

Circulars dealing with grain storage problems were issued to the grain trade through the facilities of the Board of Grain Commissioners and the North-West Line Elevator Association. Radio broadcasts and articles in weekly newspapers advised the farmers with respect to problems on the farm.

Necessary special area surveys were conducted in connection with infestations of the rusty grain beetle in distress storages at Fort William, rice weevils and granary weevils in southern Manitoba, spider beetles in Saskatchewan and the Indian meal moth in Ontario and British Columbia. Direct assistance was rendered the companies with these specific problems. Representations were made to other government agencies to secure insecticides for the treatment of infested materials and premises. Arrangements were made for the movement of infested grain to the terminals when treatment at local points was not feasible. The close contact maintained with the grain trade resulted in a well integrated system of detection and control which was of great benefit.

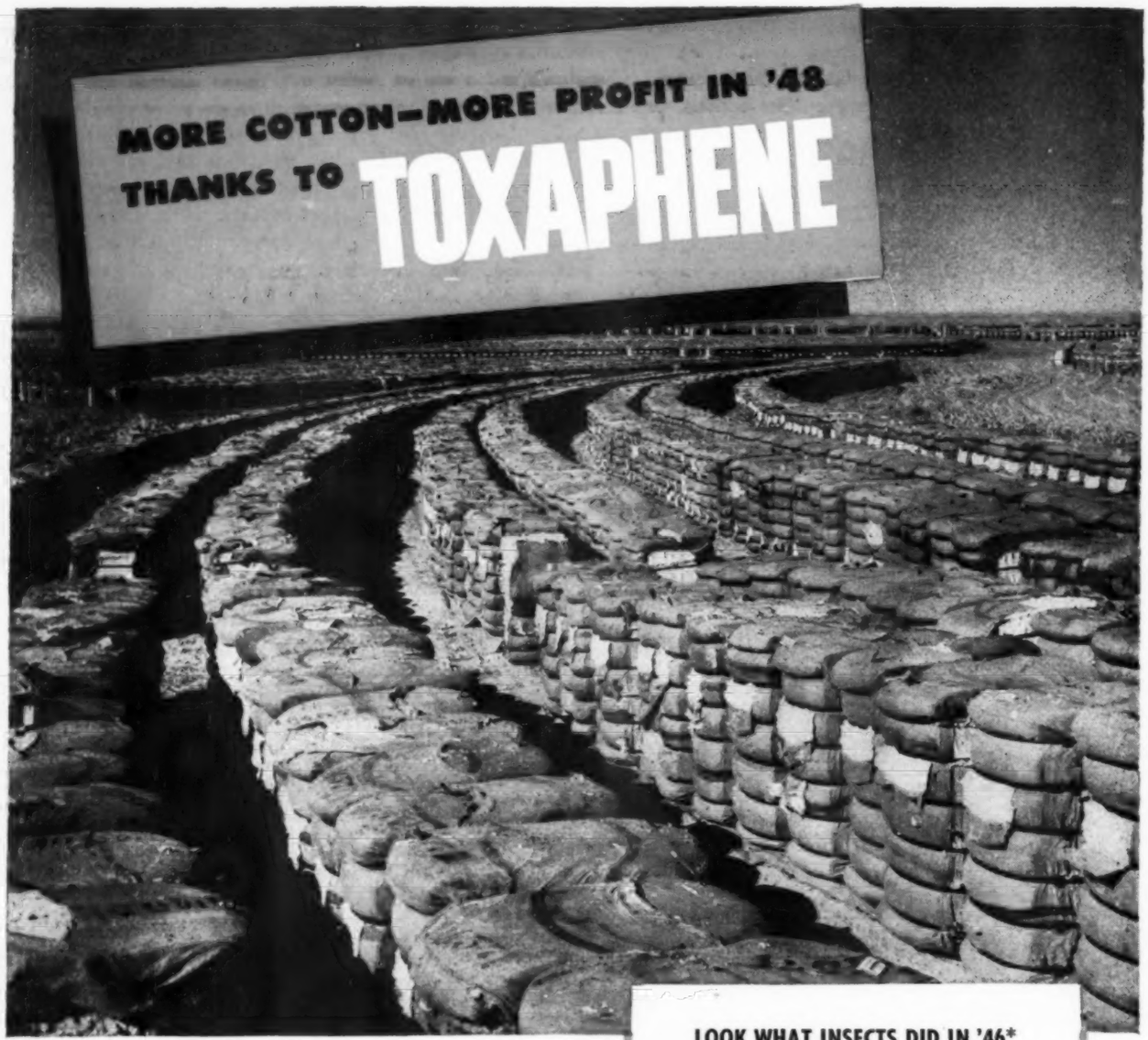
Education

IN the earlier war years, recommendations were made to the managers of the various elevator companies and demonstrations were given as to the methods of control. This proved to be reasonably effective but infestations still continued and very often the problem had become serious before any steps were taken to deal with it. It became increasingly apparent that any further improvement in actual control could only be brought about by having trained men in every elevator who could recognize insect troubles in their beginning stages and who could deal with them promptly and effectively before they really became serious.

Terminal elevator companies throughout the Dominion were invited to send selected employees to a four day course in insect control which was held at Montreal, Toronto, Fort William, and Vancouver. A total of 260 representatives of 82 different grain storage organizations were trained through educational films, lectures, examinining live and dead insects and participating in practical demonstrations in nearby elevators.

When the course was over, each elevator company assigned one of the 'trained' personnel to the task of keeping its premises in an insect-free condition. This work had first call on his time. The results were most satisfactory. Prior to the course, insect pests were found in a large percentage of the bins examined by the writer on a periodic check of elevators. When a similar examination was made in the fall following the course, a reduction of 73 per cent in infestation was noted, while in many of the elevators it was practically impossible

(*Turn to Page* 59)



Thousands of acres of cotton have been treated effectively with Toxaphene (Chlorinated Camphene) this year. Millions of boll weevils, leafworms, fleahoppers, aphids, grasshoppers, thrips and other harmful insects have been stopped in their tracks by this new cotton poison.

LOOK WHAT INSECTS DID IN '46*

- The estimated money value of crop losses to cotton insects in 1946 was $283,595,000.
- This loss increased the cost of production almost to $.06 per pound of lint.
- Loss in bales was 1,537,000 lbs., 613,000 tons of seed.
- This seed would have produced 200,000,000 pounds of margarine, or 179,000,000 pounds of shortening or cooking oil.
- The cottonseed meal and hulls would have produced 178,000,000 pounds of beef, or 500,000,000 gallons of milk.

**Statistics from National Cotton Council of America.*

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TOXAPHENE
(CHLORINATED CAMPHENE—67-69% Chlorine)

New Economic Poisons Present Difficult

Problems in Labeling

By Allen B. Lemmon*

Chief, Bureau of Chemistry
California Department of Agriculture

"ECONOMIC poison" includes not only insecticides and fungicides, but also rodenticides, herbicides, bactericides, and any other substance used for pest control. Laws requiring registration of economic poisons in California have been in effect for over 25 years. The number of products offered for registration has increased each year. At present there are about 8,000 different economic poisons registered for sale in the State. It is probable that there will be five times as many economic poisons requiring registration under the new Federal act where registration is a new process. The Insecticide and Fungicide Act of 1910 did not require registration, but beginning December 25, 1947, rodenticides and herbicides shipped in interstate commerce required registration, and effective June 25, 1948, insecticides and fungicides will require Federal registration.

The purpose of registration is to assure that economic poisons will be of value for the purpose intended, and that untried products or worthless products will not be sold to the public. We regularly receive applications for registration of products that are obviously of no value or that may be practically untried. A smooth salesman with a friendly manner can secure wonderful testimonials from farmers, but these do not demonstrate the product to have merit. With the application for registration, copies of each proposed label must be submitted so the enforcement agency will have opportunity to comment with regard to the proposed labeling before the product is offered for sale. In commenting with regard to a label of an economic poison one must remember that, in addition to catching the eye of a prospective purchaser, it identifies the product, tells how it is to be used, and what it will do. A good label tells a user six things. First, the name of the product; second, statement of ingredients; third, directions for use; fourth, poison label and cautions if the material is hazardous; fifth, name and address of the manufacturer or distributor; and sixth, net contents. These are required by law to be on the label of each economic poison. Let's consider each of them separately.

Name of Product

THE name of the product may be either a coined trade name or a common name. It must not be misleading. A descriptive or partially descriptive name may be false or misleading by giving the wrong impression of the composition of the product. For example, if the product consists of several ingredients but only one of them is specified in the name, the erroneous impression is given that it consists of only one ingredient. The lettering used for the name of one of the ingredients may be in larger type or in a color differing from the other type so it is unduly emphasized; or the ingredient mentioned in the name may be present in such a small amount that it is of no practical value in the product. In labeling, a name should be used consistently and the full brand name that is registered should be used without variation, as nicknames may be confusing.

Ingredient Statement

ON the application for registration the manufacturer states the name and percentage of each active ingredient and the total percentage of inert ingredients in order that the enforcement official may be able to judge whether the product appears to be of value for the purpose intended. Under both the California law and the Federal law this same statement is acceptable on the label, and in fact is preferred. However, if the manufacturer chooses not to disclose part of the information to the user, he is permitted an optional statement on the label. Under the Federal law the option permitted is that he may give the name of each active ingredient in descending order of the amount present and the name of each inert ingredient, and the total percentage of inert ingredients. Under California law the option permitted is the name and percentage of each inert ingredient. In order to comply with both laws, as well as those of some other states, the manufacturer should use the preferred statement of ingredients, that is, he should show the name and percentage of each active ingredient and the total percentage of inert ingredients.

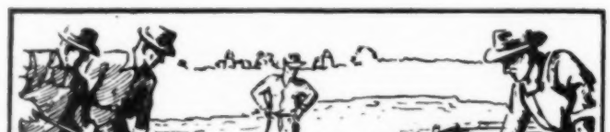
It is the purpose of the law that the names used in the ingredient

*Presented before Pacific Slope Branch Meeting of the American Association of Economic Entomologists, Vancouver, B.C., on June 14, 1948.)

FOR EASY, EFFECTIVE, ECONOMICAL

Cattle Grub Control

TRY ORBISCIDE ROTENONE PRODUCTS!



Cattle grubs in the backs of beef animals may interfere with their normal fattening. Numerous grubs in the backs of dairy cattle also may reduce the flow of milk. Now is the time to urge your ranch and dairy customers to treat their animals promptly and plan on repeating the treatment as often as necessary.

Rotenone is the only material recommended by the Bureau of Entomology & Plant Quarantine for cattle grub control. It is safe, effective, and has proved its value through extensive use over a period of several years.

Bureau entomologists give the following recommendations for the use of rotenone in controlling cattle grubs:

SPRAY—Use 7½ lbs. of 5% rotenone bearing derris or cubé powder to 100 gals. of water. Apply with power sprayer at 400 lbs. pressure. Use 1 gal. of spray per animal, holding the spray nozzle 12 to 16 inches from the backs of the animals. This is the treatment most commonly used.

WASH—Use 12 ozs. of 5% rotenone powder and 4 ozs. of granular laundry soap to 1 gal. of water. Apply about 1 pint per animal, rubbing it into the back thoroughly.

DUST—Mix thoroughly 1 part of 5% rotenone powder with 2 parts of pyrophyllite or Tripoli earth. Use about 3½ ozs. of dust per animal, rubbing it into the hair and grub openings with a stiff brush.

DIP—Use 10 lbs. of 5% derris powder and 2 ozs. of sodium lauryl sulfate to 100 gals. of water. Hold the animals in the dipping vat for two minutes.

Orbis can supply you with the right rotenone product for the job in your particular locality. Write, wire or phone today for complete information. Our technical staff is ready to help you with your insecticide problems.

CATTLEMEN—Specify Orbiscide Insecticide Concentrates when ordering from your local dealer.

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statement shall be as informative as possible to persons purchasing the economic poisons, and also to other interested persons, such as agricultural commissioners, farm advisors, entomologists, plant pathologists, rodent control officials, and physicians when it is necessary to prepare antidotes. The name used for the ingredient must be the well-known common name, if there is one. Should there be no common name and a chemical name is known, it should be used when it will be properly informative. In general, a trademark or trade name is not satisfactory as the name of an ingredient except when it has become a common name. The percentages must be stated in terms of percentage by weight. Statements in terms of percentage by volume, or so called weight-volume basis, are not acceptable under the law. Obviously, the sum of the percentages of the active ingredients and the inert ingredients must be 100%. There is no objection to additional information being given in terms of percentage by volume when such additional statements provide information necessary to a purchaser. In addition to the ingredient statement, it is desirable on solutions to show the weight per gallon of the active ingredient; for example, the pounds of 2,4-D per gallon, or the ounces of DDT per gallon of a product are desirable statements to include on the label of solutions containing these materials.

Directions for Use

DIRECTIONS for use should be adequate to enable the user to take best advantage of an economic poison in pest control. Adequate directions for use of an economic poison, as required by law, should include:

1. **The name or names of the pest, pests, or type of pest for which the product affords control.**
2. **The dilution, if any, recommended. (For example, "Use one gallon with 99 gallons water to make 100 gallons spray.")**
3. **Preparation for use. (For example, "Fill the tank one-quarter full of water. Start agitator running. Slowly add the emulsion and then fill the tank." "Mix thoroughly before using.")**
4. **The method of application. (For example, "Apply as a spray, using particular care to wet thoroughly the lower side of the leaves." "Dust plants thoroughly to contact as many of the insects as possible."**
5. **Rate of application. (For example, "Apply 15 gallons per tree." "Use 5 pounds per thousand square feet of lawn."**
6. **The time of application. (For example, "Apply when buds begin to swell in spring." "Apply when insects first appear." "Apply before plants start to head.")**
7. **The frequency of application. (For example, "Dust plants thoroughly at three-week intervals during growing season." "Do not spray oftener than twice a year.")**
8. **Warning of hazards. (For example, "When applied to a food crop, particular attention should be paid to removal of spray residue before marketing." "Do not apply to apricots." "Do not apply during exceptionally hot weather." "Do not apply to foliage." "At least two months should intervene between dusting with sulphur and applying a petroleum oil spray." "Do not spray into or near open flame." "Keep material out of reach of children and pets.")**

Where possible it is usually best to include the directions for use on the label, but both California law and the Federal law permit inclusion of directions for use in labeling accompanying the package. If the directions are in a circular or leaflet, this circular or leaflet must accompany each retail package so each purchaser will receive a copy.

Cautions

IN California the Poison Law is administered by the State Board of Pharmacy. It requires products acutely toxic to human beings to carry the skull and crossbones and the word "Poison" in red on a white background, or vice versa, and the proper prescribed first-aid treatment. In addition to the poison label, which really covers only a warning against oral intake of the material, any special cautions, such as a warning against breathing the material or physical contact with it, must appear on the label, if needed to assure proper handling of the product. Proper consideration of precautionary labeling has often been handicapped through local prejudices or experiences. The Association of Economic Poisons Control Officials, through its Committee on Toxicity to Man, is attempting to secure the best information with regard to toxicity of the different economic poisons, proper first-aid treatments, and necessary cautions. It is hoped that this committee will be able to draw up a proposed national plan that will catalog materials into different classes of relative hazard to users, and suggest proper precautionary labels for these classes of materials. If this can be done, the Federal government and the respective states will be able to operate on a uniform program which will be of great benefit, not only to manufacturers in preparing labels that will be acceptable in different jurisdictions, but also to users who, through education, will come to recognize specific warnings with regard to specific hazards.

Manufacturer's Name

IT is usually best for a manufacturer of an economic poison to assume responsibility for its registration and to have his name and address on the label of the economic poison. Under California law the name and address of the registrant must appear on the label and no attention is paid as to whether the registrant is the manufacturer. Of course no misleading statements are permitted and one could not claim to be a manufacturer if he were not, but if only a name and address appears on a label it is that of the registrant. Under the Federal law the procedure is somewhat different, in that any manufacturer, packer, seller, distributor, or shipper of an economic poison may register, and the name of the registrant need not necessarily appear on the label. It is permissible for a manufacturer to register an economic poison manufactured for the distributor, and the distributor's name and address may appear on the label provided the registrant files the name and address of the person whose name will appear on the label with the Secretary of Agriculture in connection with registration.

Net Contents

THE label of each economic poison is to bear a statement of the net weight or measure of its contents. The terms in which "net contents" are made are those in

general use by consumers and users of the particular economic poison in order to give accurate information as to the quantity. Most solid economic poisons are measured in terms of pounds and ounces; most liquid economic poisons in terms of the United States gallon, quart, pint, and fluid ounce.

Necessity for Uniformity

WHEN one considers all of the information necessary for a good label for an economic poison and to secure registration for a product, it is realized that there must be teamwork in order to coordinate the necessary data. It would be an impossible situation if a manufacturer were required to print a separate label for each jurisdiction in which he wished to sell. The responsible control officials of the states and the Insecticide Division of the U. S. Department of Agriculture have recognized these problems and have formed the Association of Economic Poisons Control Officials with the hope that uniform labeling requirements can be developed. Progressive steps forward have already been made by this organization. In April, 1948, its Executive Committee met with Federal officers in Washington, D.C., to study and make recommendations concerning proposed interpretative statements with regard to Federal label and registration requirements. Interpretations and policy statements are often needed to clarify our laws which must necessarily be broad. Unfortunately these statements sometimes have a far-reaching effect not intended. The outstanding characteristic shown at the enforcement control officials' meeting is the cooperative attitude and desire to do justice to all groups.

There is much that we do not know concerning some of the older widely-used economics poisons and this serves to emphasize how much we must learn rapidly about newer products. The increased number of new synthetic organic chemicals used for pest control purposes has brought additional registration and labeling problems to law enforcement officials. Registration cannot be issued until a product is demonstrated to be of value for the purpose intended, and yet it is very difficult along the line to determine just when a new economic poison is ready for commercial sale.

Experimental Materials

FORMERLY new economic poisons were developed gradually, several years usually elapsing between laboratory development of a new product and actual commercial sale. This permitted development of more data concerning effects of yearly changes due to weather factors and to repeated applications. With the advent of DDT however, the picture changed. The public became excited, either for or against it, and a tremendous amount of experimental work was done simultaneously. Farmers and other users demanded the material even before anyone knew how it should be properly used or what was proper labeling. This was understandable on account of wartime secrecy, but before the DDT picture became clear the same type of hysteria on a slightly smaller scale, followed with regard to 2,4-dichlorophenoxyacetic acid, chlordane, tetraethyl pyrophosphate, and now parathion. It has been one of our guiding rules that manufacturers should not experiment at the expense of farmers. Of course, in order to develop a new product, considerable numbers of test plots should be carried on, and where a farmer wishes to cooperate with the manufacturer there is no objection from our office to such cooperation. The manufacturer should not sell experimental material to the farmer.

Labeling Parathion

THE term "parathion" is the common name for the insecticidal chemical O, O-diethyl O-p-nitrophenyl thiophosphate. The technical product is reported to contain 95% or more of the pure chemical. It may be formulated as an emulsion concentrate, as a dust, as a water dispersible powder, or as an aerosol, but on account of unknown hazards not fully studied, it is believed that for the present it should be marketed only as a water dispersible powder or as a dust. In one year extensive tests have been carried on over a large portion of the United States and considerable data has accumulated with regard to the outstanding characteristics of this material.

Residual action against insects has indicated that possibly there may be a spray residue problem if parathion is used on edible portions of crops. From the analyses made by different laboratories to determine amounts of spray residue present, it appears that, in general, if the number of applications is restricted and the amounts applied are quite small, there should not be any spray residue problem if no applications are made within 30 days of harvest. The acute toxicity tests have shown undiluted parathion to be acutely toxic but chronic toxicity tests take a long time to tell a complete story. It appears that chronic effects may not be as serious as first feared. In order to protect the public as much as possible it is believed that all products containing parathion in any amount should carry precautionary statements with the skull and crossbones and the word "Poison" in red on a white background, and the antidote, as follows:

Antidote Internal: Give a tablespoonful of salt in a glass of warm water; repeat until vomit fluid is clear. Have victim lie down and keep quiet. Call a physician immediately.
External: If skin is accidentally contaminated, wash thoroughly with soap and warm water.

Under the Federal act it appears probable that preparations containing less than 2% may not be classed as highly toxic to human beings and need not require the skull and crossbones, although the warning statement will be necessary. The precautions and warning statement to be shown on all labels are as follows:

Warning: Extremely hazardous if swallowed, inhaled, or absorbed through skin.
Rapidly absorbed through skin. Do not get in eyes, or on skin. Wear protective gloves, clothing, and goggles. If spilled on skin, wash immediately with soap and warm water.
Do not breathe fumes, dust, spray mist, or aerosol. Wear a mask or respirator approved by the U. S. Bureau of Mines.
Do not contaminate food or foodstuffs.
Wash hands, arms, and face

(*Turn to Page 73*)

The Listening Post

New, Unusual Plant Disease Development

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

CABBAGE yellows is a widely distributed and very important disease of cabbage and related crops. It is caused by a soil-inhabiting fungus, *Fusarium conglutinans*, which prevents successful growing of any but resistant varieties once it becomes established in a field or region.

What is believed to be the first authentic record of its occurrence in New Mexico is reported by P. J. Leyendecker of the New Mexico Agricultural Experiment Station. Diseased cabbage plants brought to the Station for diagnosis showed symptoms resembling those of bacterial black rot, but the yellow fungus was found to be the cause in every case. Approximately 5 to 10 percent of the plants in the field from which the diseased specimens came were affected. Adjacent cabbage fields examined also contained varying numbers of diseased plants.

It is now believed that the organism has been present in southern New Mexico for a number of years. All growers agreed that the symptoms observed this year have occurred in their fields for several seasons, but were attributed to faulty transplanting, insect damage, or hot weather. More land is being planted to cabbage each year in southern New Mexico, and increasing reports of the disease may be expected.

Verticillium Cotton Wilt

A WIDESPREAD soil-inhabiting fungus, *Verticillium albo-atrum* attacks numerous different kinds of plants, causing wilt. On cotton it has been reported to occur from Tennessee and Mississippi westward. In parts of Texas and New Mexico in particular, damage has been severe in some seasons.

S. G. Lehman and Howard Garriss of the North Carolina Agricultural Experiment Station and Agricultural Extension Service, respectively, reported the discovery of the disease on cotton in that State in 1947. Specimens of wilted cotton plants were received during July from Hertford, Union, and Bertie Counties. When *Verticillium* was identified as the cause of the wilt, additional collections were made in other localities. As a result, from wilted plants collected on 20 farms in 9 counties, *Verticillium* was found on 14 farms in 7 counties, including besides the three already named, Edgecombe, Northampton, Davie, and Mecklenburg Counties. From the location of these counties, at opposite extremes of the State from Union and Mecklenburg Counties, touching South Carolina, to Hertford and Northampton Counties adjoining Virginia, it seems probable that infested fields might have been found in other counties if an intensive survey has been made. This wide distribution in the State indicates that the fungus may have been present in cotton for some years before 1947. The owner of one farm in Hertford County saw the disease in 1945, and owners of two farms in Union County saw it in 1946. All three of these farmers thought that the disease was the *Fusarium* wilt of cotton, which is common in the State, and had planted a *Fusarium*-resistant variety in 1947. All had moderate to high percentage of disease in 1947. It is this attack of a wilt disease on a variety resistant to the commonly known cause, *Fusarium*, that is responsible for the discovery of the occurrence of *Verticillium* on cotton in the State.

Infection in fields observed ranged from less than 1 percent to 40 percent, and was usually concentrated in an area of high percentage attack at one edge with much lower infection in other parts of the field. Quite often the most highly diseased part of a field was adjacent to a dwelling and probably had formerly been used as a family garden. Perhaps the fungus may have developed first on some garden vegetable such as potato, tomato, or okra, which are among the most susceptible of its many hosts, and appeared on cotton when the space was utilized for that crop. The greatest amounts observed were in fields where cotton had been grown continuously for three or more years or where a rotation of cotton and peanuts in alternate years had been used for a long period. Less severe attack was observed where cotton followed corn.

Stemphylium Leaf Spot

EARLIER in the year (*Agricultural Chemicals Feb.* 1948, p. 43) the Listening Post contained an account of the *Curvularia* spot disease of gladiolus in Florida. The same reporter, R. O. Magie of the Florida Agricultural Experiment Station, reports that during the past decade a leaf spot caused by a species of *Stemphylium* has brought an annual loss to the gladiolus cut-flower growers of the State. Two-thirds of the acreage, about 3400 acres, is planted to a susceptible variety, Picardy. The fungus attacks the leaf and stem tissue. The disease may kill the leaves before flowering, causing a total loss; or more often the leaves are killed prematurely after the flowering spikes are cut, resulting in smaller, less vigorous corms.

Infection takes place during wetting periods as short as 10 hours. Dew periods are sufficient for infection. Epidemics occur in the absence

of rain, but occasional fogs undoubtedly play a part in the rapidity with which the fungus spreads and kills the plants. The most susceptible varieties often have their leaves killed two weeks after the first infections are visible.

The disease disappears during the summer and autumn months and reappears in the winter, usually about three weeks after a cold period. Epidemics occur when the daily temperature range is from 55° to 75°and 64° to 84° F. Higher average daily temperatures sharply reduce or prevent infection. Although favorable weather conditions occur in the autumn, the disease has not been seen at this time.

Varieties of medium susceptibility such as Picardy are always affected more severely when grown near the very susceptible varieties Stoplight and Casablanca. The disease is often seen first on the more susceptible varieties, and spreads radially to the less susceptible sorts, infection decreasing with distance from the focal point.

Fungicides have not provided complete protection from the *Stemphylium* leaf spot disease, but even the most susceptible varieties are protected sufficiently, by spraying with the zinc ethylene bis-dithiocarbamate materials, to keep the foliage green until normal corm harvest time. "Phygon" at ½-100 was as effective as "Dithane" and "Parzate" sprays but caused a reduction in the size of the corms. "Phygon" has also caused the leaves to die in two weeks before those on the non-sprayed plants. It is suggested that the more susceptible varieties should not be planted near the less susceptible, and that successive plantings of the latter should be separated by resistant kinds.★★

Status of Insect Pests in July and August

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

THE velvetbean caterpillar began to make its appearance this year somewhat earlier than usual. By the latter part of July it had caused some damage to peanuts in Jackson and adjoining counties in Florida. Adult caterpillars only were reported from Okaloosa County, Florida and from Houston and Henry Counties, Alabama on July 30. Also on July 30, the caterpillar was reported on soybeans in Louisiana, south from West Baton Rouge Parish along the Mississippi River and Bayou La Fourche, where it was rather abundant in Iberville Parish and southward and causing some slight ragging. By early August it had appeared at Tifton, Georgia in some peanut, soybean, and velvetbean fields. The infestation was moderately heavy but not general in that area.

Toward the end of July an early rather widespread outbreak of the fall armyworm had become general throughout the Atlantic States from southern Virginia south to Florida and as far west as Mississippi. Good control of these early infestations was generally reported to have been obtained with applications of DDT or chlorinated camphene dusts. By early August the next generation had begun to appear in some sections with a possibility of greatly increased abundance and more widespread distribution than that which occurred in the earlier generations. Control became complicated as harvest approached, because of the residue factor on crops to be used for fodder or storage.

Severe infestations of the granulate cutworm in peanuts were reported from Jackson and adjoining counties of Florida about the middle of July.

Codling moth infestations remained generally at a low level in most apple areas during late July and early August. Toward the end of July heavy infestations of this insect in walnut were reported from San Joaquin County, California.

Activity by the red-banded leaf roller, which appeared to be in a stage between broods in most eastern and mid-western apple areas shortly after the middle of July, continued to increase in most areas during the rest of that month and the first half of August. In New Jersey this insect was sufficiently abundant in several orchards to cause serious injury to the fruit if conditions continue favorable. Widespread damage to apple foliage and fruit was reported from eastern West Virginia. About 20 percent of the Wealthy apples harvested in Washington County, Maryland were said to have been damaged. The infestation was lighter than a year ago in southern Indiana, but several scattered orchards in northern Indiana and western Kentucky were in serious danger of being damaged by this pest.

Orchard infestations of the European red mite continued to increase in many areas during the last half of July, including New Jersey, Maryland, Ohio, southern Indiana, Wisconsin, Missouri, northern Utah, and the Yakima Valley of Washington. A sharp decrease in infestations was reported from the Kearneysville district of West Virginia shortly after the middle of July. By early August, infestations had begun to decline generally except in New Jersey where some increase was still taking place. The two-spotted spider mite was active in many orchard areas during late July and early August, population increases being reported from the Hudson Valley of New York,

(*Turn to Page* 69)

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Technical Briefs

Sheep Dip Experiments

Separate pairs of sheep were dipped in baths of DDT at concentrations of 0.5, 0.25, and 0.125 per cent and then allowed to run in a paddock with two undipped sheep. Live keds from sheep running elsewhere were distributed in the fleece of dipped sheep at intervals during 74 days following dipping and additional infested sheep were placed in the paddocks. Almost daily examinations were made for 102 days.

Similar trials were run with sheep dipped in benzene hexachloride. The single dipping in any of the concentrations with either product apparently rendered the fleece toxic to keds for a sufficient length of time to insure eradication of keds from isolated groups of sheep, and dipping them three times a year in 0.5 per cent concentration would keep the fleece permanently toxic to keds. G. B. S. Heath, *Vet. J.* 102, 285-5.

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Cucurbit Experiments

Tests with commercial and aerosol grades of DDT, and rotenone dusts were applied on seven cucurbit varieties during the growing season to determine the effect of these materials on the total yield, maturity, and grade of the harvested fruits. The varieties used included Table Queen, White Bush Scallop, Small Sugar, Connecticut Field, Pride of Wisconsin, Delicious, and Woodruff's Ace.

The commercial DDT dust treatments on Table Queen, Small Sugar, and White Bush Scallop, resulted in a statistically significant reduction in yield as compared with the rotenone treated plants. The muskmelon, Delicious, was the only variety of the seven cucurbits tested, where the commercial DDT treatment resulted in a statistically significant increase in yield over the rotenone treatment.

In only one instance did the aerosol DDT dust result in a statistically significant reduction in yield as compared with rotenone and this was the variety White Bush Scallop. With the six remaining varieties the aerosol grade DDT plants produced as large a total yield, and in the case of Delicious, and Small Sugar, a statistically significant increase in yield as compared with rotenone.

Neither the commercial nor the aerosol DDT treatments caused any significant change in days to maturity or in percent of marketable fruits as compared with the rotenone.

The aerosol grade DDT compared favorably with rotenone as an insecticide on the above varieties. The more effective insecticidal value of the aerosol DDT would indicate that where cucurbit insects are a major problem, this dust might be used in preference to rotenone.

The commercial grade of DDT available at the present time should not be used on cucurbits, especially if the aerosol grade DDT is available. While a few varieties of cucurbits are fairly tolerant of commercial DDT, most varieties may be seriously damaged.

—*Food Packer,* Magazine, August, 1948.

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2,4-D Residue Varies

The residual effects of 2,4-D in soil treated for weed elimination vary according to environment, according to Carl J. C. Jorgensen and C. L. Hammer, Michigan State college horticulturists.

Three chemically different forms of 2,4-D were used to treat soil which had been inoculated with weed seed containing more than 20 kinds of weeds, grass, and clover. Some of the treated flats of soil were kept in the greenhouse, some were placed outside, and others were put under cold storage conditions. At intervals varying from one to eight weeks after treatment, 10 seeds each of sweet corn, garden pea, and radish were planted in designated flats.

Results showed that soils treated with 8 or 16 parts per million of 2,4-D before weed seeds had germinated were virtually weed-free. The various temperatures made no difference in the effectiveness of 2,4-D as a weed killer, but the soil remained toxic to economic crops longer at freezing or subfreezing temperatures. Difference in acidity, in the organic matter in the soil, and in the moisture content of the soil, greatly affected the value of 2,4-D as a soil treatment for weed control. On the other hand, the acidity did not greatly affect the rate at which toxicity was lost from the soil.

Continuing further, they report that sodium 2,4-D disappeared from water-saturated flats in three weeks, but was still present in air-dry flats after 8 weeks. Because of this, it was pointed out that it would be unwise to use 2,4-D during periods of drouth or in drouthy regions without recognizing this factor. Eight parts per million of sodium 2,4-D were ineffective in killing weed seeds in muck. Corn was more highly resistant to 2,4-D materials under all conditions than either peas or radishes.

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Fungicide Requirements

The use of fungicides is generally preventive. In very few cases can fungicides be used to eliminate infections already begun. Fungus diseases run rampant chiefly during wet weather. As far as is known, a chemical must be in solution before it will kill a fungus. These circumstances establish a pattern for fungicides, irrespective of their composition, that is an optimum compromise among the factors concerned. Because they must be resistant to weathering, they must be somewhat water-insoluble, although soluble enough to kill the fungus protoplasm.

In the past, research emphasis in developing new fungicides has been directed at finding fungus killers. Recent research indicates that prevention of reproduction may be of significance. If the fungus cannot repro-

duce itself it cannot induce any great amount of damage. Treatment of plants from the inside, for example, is being tried in combating the Dutch elm disease, by use of 8-hydroxy quinoline benzoate. J. G. Horsfall, *Ind. Eng. Chem.* 40 681- (1949).

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New Seed Disinfectant

A new seed disinfectant, "Seedox," developed by Sindar Corp., New York, and to be sold exclusively through R. J. Prentiss & Co., New York, has just reached the commercial stage. Its principal advantage is said to be its non-toxicity in comparison with the mercurials. Brought out originally as "Mycotox," it has been under test since 1946, much of the test work having been performed by Dr. C. H. Arndt, plant pathologist at the South Carolina Experiment Station, Clemson College, Clemson, S. C. Preliminary reports have appeared in Supplements 175 and 176 of the *Plant Disease Reporter,* published by the U. S. Department of Agriculture, May, 1948, and a more complete study of later test results is now in preparation by Dr. Arndt, to appear in an early issue of *Agricultural Chemicals.*

In a recent interview with R. E. Horsey, sales manager of Sindar Corp., and Friar Thompson, head of the insecticide department of the R. J. Prentiss & Co., an important role was forceast for the new product in the control of anthracnose fungus to improve emergence and survival of cotton seedlings.

The health hazard they point out has long been a limiting factor in the use of many cottonseed protectants. Toxicological evaluations on laboratory animals indicate "Seedox" to be virtually non-toxic. Single doses of 1.3 gms. per kilogram of animal body weight were established as the mimimum lethal dose. Chronic feeding tests on laboratory animals showed no adverse effect on the normal growth of the test animals. Large animal feeding tests have been conducted and after feeding the test animals for six months at an abnormally large dosage, no toxic manifestations have been observed. No retardation of growth was recorded and pathological examination of the internal organs of the animals showed no deterioration or abnormalities. While many cottonseed disinfectants and protectants have a vesicant action when left in prolonged contact with the skin, they point out that "Seedox" is safe to handle in normal seed treating methods. "Seedox" has also been used for the treatment of other agricultural seeds to control losses from damping-off seed borne organisms as well as soil borne organisms. Dosage recommendation on seeds other than cotton are tentative until additional tests are made.

Chemically, the new product is described as 2,4,5-Trichlorophenyl acetate. Formulated for field use, it is offered as a 50% powder referred to as "Seedox-50." The basic chemical is made by Sindar Corp., an affiliate of Givaudan- Delawanna, Inc., New York. Exclusive processing of the basic chemical for use, as well as exclusive sales, are to be in the hands of R. J. Prentiss & Co.

Suppliers' Bulletins

Weed Killer Booklet

Monsanto Chemical Co., St. Louis, Mo., has issued a 40 page booklet "The Killers in the Field," presenting the weed problem in agriculture. It presents statistics showing the economic losses incurred each year through the presence of weeds, and discusses the almost phenomenal viability of weed seeds under conditions which would kill almost any domestic crop seed. It tells the story of how after a half century of being buried in glass bottles, 20 percent of a group of weed seeds were still capable of germination. The booklet then points out the steps being taken in chemical control of weeds, and traces the development of these methods from the beginning. Copies of the booklet are available from the company.

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DDD vs Mosquitoes

The Rohm & Haas Reporter magazine carried in its July issue a feature article on the use of the company's product, "Rhothane D-3" in the control of mosquitoes. The product, dichloro diphenyl dichloroethane, has been found as toxic to mosquitoes as DDT, but has not proved as toxic to fish and warm-blooded animals. The article reports experiments carried out in the State of New Jersey, and shows a number of operations with photos accompanying the article.

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Offers Fertilizer Folder

Saratoga Laboratories, Inc., Saratoga Springs, N. Y., has issued a booklet describing its product, "Trace L," a water soluble 8-16-7 fertilizer with essential minor elements. The bulletin states that "Trace L" supplies essential trace elements to growing plants along with common fertilizer elements N P K. In addition to the usual three, the guaranteed analysis states that the product contains calcium, magnesium, sodium, sulfur, iron, manganese, boron, iodine, zinc, copper, molybdenum, cobalt and chlorine. Copies of the booklet are available from the company, Saratoga National Bank Building, Saratoga Springs, N. Y.

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Announces New Duster

Champion Sprayer Co., Detroit, Michigan, has announced a new double-action duster for use on

ground crops, grape vines, berries and fruit trees. The new machine is carried like a knapsack, and operated by a lever manipulated by the user. The makers state that the lever action grinds and mixes powder within the lead-coated steel tank, and that the machine is free from gears or bulky mechanisms. The flow of dust may be regulated quickly for any need, the company says. The entire top is removable for easy filling, and a number of fittings are available to add to the duster's versatility. The machine weighs 14 pounds empty, and holds 15 pounds of powder. Further details are available from the company.

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Faesy & Besthoff Catalog

Faesy & Besthoff, Inc., New York, have just issued their new catalog listing their complete line of agricultural and industrial chemicals. The booklet gives a brief history of the company, founded more than 25 years ago, a description of its warehouse facilities at Hicksville, Long Island, and information about its repackaging facilities.

Photos of the firm's warehouse are presented on a number of the pages, and on the back page is a complete list of firms who are represented by F & B. Copies of the catalog are available from the company, 220 E. 42nd St., New York 17.

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Booklet Notes Turf Worm

O. M. Scott & Sons Company, Marysville, Ohio, in its publication *Turf Talks* (Volume 13, Issue No. 34) discusses the problems arising from the tropical earthworm which plays havoc with turf areas such as golf courses, tennis and bowling greens as well as lawns. The story reports that scientists working on the problem include J. A. Adams, New York Agricultural Experiment Station; J. C. Schread, Connecticut Station, New Haven; W. E. Fleming, U.S.D.A. B.E.P.Q., Moorestown, N. J.; and G H. Ahlgren, agronomist, Rutgers University, New Brunswick, N J. Copies of the booklet may be obtained from O. M. Scott & Sons Co., Marysville, O.

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New Wood Preservative

Pentachlorophenol is being used as a protectant against decay and insect attack in wood, by Michigan Pipe Co., Bay City, Mich. The firm makes wooden pipe, serving a number of industries with wood-lined pipe and tanks and vats. Lasting protection is given by pentachlorophenol, it is stated, against fungi, termites and other wood-destroying insects. The material is used successfully in treating lumber because it is clean and free from objectionable odors, non volatile and insoluble in water.

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Insecticide Article

The July-August issue of the DuPont magazine carries a feature article on the insecticide "Marlate," an analog of DDT. Entitled "Safer Insecticide," the article stresses its low degree of toxicity to warm-blooded animals and to plants. Its residual properties enable it to carry killing power for as long as two or three months, down to "several weeks," depending upon the amount used. "Marlate" is used either as dust or spray, the article points out.

INDUSTRY NEWS

Floriculture Cites Smith

Dr. Floyd F. Smith, entomologist of the U.S.D.A. Bureau of Entomology and Plant Quarantine has received an award from The Society of American Florists and Ornamental Horticulturists, for the year's outstanding accomplishment in floriculture research. The cash award, in recognition of the work he has done in the development of aerosols for the control of insects and mites affecting greenhouse ornamentals, was presented to Dr. Smith in Chicago on August 2, at the 64th Annual Convention of the Society. Aerosols containing tetraethyl pyrophosphate have given outstanding control of a number of greenhouse pests. Roses have produced longer stems as a result of the treatment, and in some houses production increased as much as 30 percent. The aerosol method enables growers to treat crops more quickly and with more economy than by spraying or dusting.

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Weed Control Dates Set

The North Central Weed Control Conference has announced that its 1948 meeting will be held at the Abraham Lincoln Hotel, Springfield, Illinois, December 8, 9 and 10.

Charles H. Keltner of the Illinois Department of Agriculture, states that industries and individuals who desire to exhibit weed killer materials or equipment should communicate with him immediately. His address is room 603, Armory Office Bldg., Springfield. He also suggests that hotel reservations should be made as soon as possible.

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Forms West Coast Company

Eugene S. Heckathorn has announced that he has established a business of his own, Heckathorn & Co., Ltd., in Richmond, Calif. The new firm will act as agents for R. J. Prentiss & Co., Inc. of New York, and will specialize in the custom grinding and manufacture of insecticide concentrates. Mr. Heckathorn was the manager of the west coast

EUGENE S. HECKATHORN

plant for R. J. Prentiss & Co. for a year preceding his purchase of the facilities in Richmond. He joined the Prentiss organization following a career in the U.S. Navy.

The company offers a rather unique service in that the manufacturer can deliver the technical grade to Heckathorn & Co., and the latter will furnish all other ingredients and give chemical control of the product. Mr. Heckathorn points out that the place of the custom manufacturer has become particularly important since the cost of freight transportation is an important factor in the pricing of insecticides.

The address of Heckathorn & Co. is at Fourth Street and Cutting Boulevard, Richmond. Mail is sent to post office box 1407.

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Canadian Weed Conference

The Second Western Canadian Weed Control Conference will be held in Winnipeg, Man., November 3, 4 and 5, 1948 under the auspices of the National Weed Committee of Canada (Western Section) according to H. E. Wood, chairman. Mr. Wood, of the Manitoba Department of Agriculture, Winnipeg, states that the program will feature the results of extensive experimental work on weed control undertaken in western Canada during 1948, with emphasis on the use of 2,4-D and related preparations. Progress reports on weed surveys and other phases of the program will be received from Provincial workers.

The committee has extended an invitation to weed workers from the U. S. to join in reviewing the work of the current year, and to participate in making plans for coordinated effort in weed control for 1949. Members of the committee, in addition to chairman Wood, are George Knowles, Central Experimental Farm, Ottawa, Ont.; W. H. Horner, Saskatchewan Dept. of Agriculture, Reginia; A. M. Wilson, Alberta Dept. of Agriculture, Edmonton; and R. O. Bibbey, secretary, National Weed Committee, Ottawa, Ontario.

Meetings

Economic Poisons Control Officials, Second Annual Convention, October 9, Shoreham Hotel, Washington, D. C.

California Fertilizer Association 25th Annual Convention, October 18 & 19, Mission Inn, Riverside, Calif.

Western Canadian Weed Control Conference, 2nd Annual Meeting, November 3, 4 and 5, Winnipeg, Manitoba.

National Fertilizer Ass'n., Fall Convention, November 15, 16 & 17, Atlanta Biltmore Hotel, Atlanta, Ga.

American Phytopathological Society, December 6, 7 & 8, Pittsburgh, Pa.

North Central Weed Control Conference, December 7, 8 and 9, Abraham Lincoln Hotel, Springfield, Illinois.

Amer. Ass'n. Economic Entomologists, New Yorker Hotel, New York, December 13-16, 1948.

Ethyl Corp. Makes BHC

Benzene hexachloride is being produced at the Ethyl Corporation plant at Baton Rouge, La., the Ethyl Corp. has announced. The product is for sale to insecticide manufacturers, the company states.

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Fertilizer Application

Ammonium sulphate is applied directly to the land by farmers and it is therefore desirable to have the sulphate in a form which can be readily distributed.

The caking of sulphate is caused by the sticking-together of sulphate crystals at their points of contact by a cement produced by the the drying of a saturated solution of ammonium sulphate on the crystals. The degree of caking depends under given conditions on the surface of the crystals, their impurities and size and shape. It is the size and shape that we should consider more closely.

The original synthetic ammonium sulphate consisted of small cube-like crystals similar to sugar crystals. A new type which has been developed is cigar-shaped and very much larger. There are fewer points of contact between the crystals both on account of their size and shape and caking is now very much less.

These crystals are produced in an acid solution containing a trivalent ion and are grown to a suitable size by keeping the crystals for a sufficiently long time in contact with a super-saturated ammonium sulphate solution.

—Summary of paper by John Manning, Billingham, England, before XIth International Congress of pure and applied chemistry, London.

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Rat Committee Asks Aid

The final report of the national committee for rat control, presented in August to Secretary of the Interior Julius A. Krug, recommends a Federal investment of $3,000,000 a year to reduce the rat population in the United States. The report, presented to the Secretary by the committee chairman, Hamilton M. Warren, vice-president of National Carbon Co., New York, pointed out that the 140,000,000 rats in the nation not only destroy food and property valued at some two billion dollars a year, but present a potential "fifth column" for bacteriological warfare.

The $3,000,000-a-year program of Federal aid to the states to finance rat control measures was proposed in a bill introduced to the Eightieth Congress by Representative Raymond H. Burke, Republican of Ohio. The bill gained but little attention at that time, but is expected to be re-introduced next year.

The plan calls for the Federal government to add two additional dollars to each dollar provided by the state to combat the rodents. Most United States cities need stronger rat control ordinances with "severe penalties" for violations, the report observed.

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Connecticut Field Day

The Connecticut Agricultural Experiment Station field day was held August 18, with some 1,000 persons in attendance. Visitors from all the New England states were present, in addition to representatives of New York, Pennsylvania, New Jersey, Illinois, Kansas and Virginia. Dr. E. C. Stakman, president-elect of the American Association for the Advancement of Science, and chief plant pathologist at the University of Minnesota, in his talk said that plants and farmers are the most important things in the world, because human subsistence depends upon them. At the end of his talk, he was presented with a gavel by Dr. James G. Horsfall, director of the Connecticut station. Dr. Horsfall remarked that the gavel should be used to call to the attention of the A.A.A.S. the serious threat of Dutch Elm disease which now threatens many of the shade trees of the country. He asked Dr. Stakman to bring this problem before the A.A.A.S. for discussion.

During the day, all field plots at the Experimental farm at Mt. Carmel were open for inspection, and the entire station staff was present to discuss the work being done by the station.

Advancement For Sprague

Monsanto Chemical Co., St. Louis, Mo., has announced the appointment of Johnathan H. Sprague, Jr., Boston, as a technical representative in Washington, D. C. He will join the staff of Phillip Singleton, in charge of the company's Washington bureau.

Mr. Sprague is a graduate of Massachusetts Institute of Technology with a BS and MS in chemical engineering. He joined Monsanto in 1944. In 1946 he attended Harvard Business school to earn a master's degree in business administration. Upon securing his degree, he returned to Monsanto as office manager of the company's Merrimac Division, Everett, Mass.

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Hold Chem. Exposition

The Fifth National Chemical Exposition will be held in Chicago October 12-16, the Chicago section of the American Chemical Society, sponsors of the event has announced. The theme of the Exposition will be to reveal the progress of industry, central exhibit of which will be "Chemical Trail Blazers." The objective of this display, according to Dr. L. E. Clifcorn, chairman, is to "blaze the trail of the future and reveal the latest discoveries, ideas, applications and developments in the industrial chemical field."

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To Larger Quarters

Oronite Chemical Co., San Francisco, Calif., has announced that it has moved its offices to new and larger quarters at 38 Sansome St., San Francisco 4, Calif.

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New Areas Quarantined

Quarantine for pink bollworm has been extended to include eight counties in Oklahoma, one additional county in New Mexico, and 43 Texas counties north and east of the already regulated zone in the Panhandle. Previous areas under quarantine included sections of southern Arizona, southern New Mexico and the greater part of Texas, according to the U.S.D.A. bureau of Entomology and plant Quarantine.

2,4-D Flying Service

Don Pratt, manager of the Hays, Kansas airport, has organized a commercial spraying service for farmers in the wheat belt. As many as 50 planes, including two helicopters are expected to be available for this service. The helicopters are expected to be used in fields where oil derricks and other high obstructions prevent low flying necessary for effective spraying.

The flying service has cooperated closely with the Agricultural Experiment Station there, and has based its spraying program on the recommendations of F. L. Timmons, U.S.D.A. weed specialist at the Station. Farmers in the area are looking to 2,4-D as an aid in raising weed-free wheat, and the flying service is geared to this need. Application is made at the rate of one-third pound of 2,4-D to the acre. The material is dissolved in diesel oil. Farmers are charged $1.95 per acre.

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Offers Purified DDT

Geigy Co., Inc., New York, has placed on the market insecticidal dusts containing purified DDT rather than technical DDT which in some cases has reportedly retarded certain cucurbits in some areas of the U.S. Products on the market containing purified DDT are designated by mention of the grade of DDT in the name, and others by the statement reading "DDT setting point 103° C" in contrast to the 89° C. of technical DDT.

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Hilbert Advanced in USDA

Dr. G. E. Hilbert has been appointed Chief of the Bureau of Agricultural and Industrial Chemistry by Secretary of Agriculture Charles F. Brannan. Dr. Hilbert succeeds Dr. Louis B. Howard, who resigned to accept the position of head of the Department of Food Technology in the College of Agriculture, University of Illinois.

The new appointee has been director of the laboratory since early in 1946. He is a native of Holyoke, Mass., and holds degrees from Rensselaer Polytechnic Institute, Lafayette College, and Yale. He entered the Department of Agriculture in 1930 to work on fertilizer research. Eight years later he became scientific advisor to the Chief of the Bureau of Chemistry and assisted in correlating and coordinating the program of the four regional research laboratories.

Dr. Howard is a native of Bloomington, Ill., and holds degrees from Purdue University and the University of Chicago. He entered the U.S.D.A. Service in 1930 and has been associated with the Bureau of Agricultural and Industrial Chemistry for the past 15 years. In 1945 he was named assistant chief of the Bureau, and was made Chief on April 1, 1946.

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Reichard is Advanced

Michigan Chemical Corp., St. Louis, Michigan, has appointed Earl L. Reichard as Eastern Manager of chemical sales in addition to his duties as head of the export sales division of the firm. Mr. Reichard succeeds William F. Green, resigned, and is maintaining his headquarters at the company's eastern sales office, 230 Park Ave., New York.

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Receive Army Ammonia

Four American fertilizer manufacturers participated in the initial allocations of Army-produced anhydrous ammonia, in accordance with provisions of the Foreign Aid Appropriation Act which requires domestic distribution of 10 percent of the anhydrous ammona produced by or for the Army and establishes certain allocation preferences among producers of ammonium sulfate.

The U. S. firms receiving this material last month were Farm Service Co., Oakland, Calif.; A. F. Pringle & Co., Inc., Charleston, S. C.; Greenville Chemical Co., Greenville, Miss.; and Columbia Metals Co., Seattle.

In making allocations of Army-produced supplies, the availability of anhydrous ammonia from other sources is taken into consideration, Department of Commerce Officials stated.

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Dr. Lutman Dies

Dr. B. F. Lutman, Vermont plant pathologist well known for his work on control of potato diseases, died July 20 at Burlington, Vt. He was an early authority on spraying for the control of late blight of potatoes, and one of his bulletins on the subject, published by the Vermont Agricultural Experiment Station, became one of the standard works upon which later spraying developments were based. Dr. Lutman had also been active in the establishment of the state's potato seed certification program.

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Plane Aerosol Studied

The U.S.D.A. is considering the use of an aerosol formula in connection with a flexible manifold system on airplanes to kill insects which the plane might carry from other parts of the world. Preventing the introduction of foreign insects to the U. S. by plane is considered to be of great importance by both the U.S.D.A. and the U. S. Public Health Service. The device presently under test on a C-47 plane loaned by the army for the purpose, consists essentially of a centrally located aerosol supply tank from which copper tubing connects to electrically controlled valves containing aerosol nozzles. The latter are so located that, as the valves are operated, the insecticidal aerosol completely fills the plane and kills any insects which may be present.

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AIF Committee Growing

Roster of the coordinating committee being organized by the Agricultural Insecticide & Fungicide Association is virtually completed, the August issue of the AIF *News* announced. The latest name to be added to the committee roster was that of Dr. C. E. F. Guterman, director of the New York State Agricultural Experiment Station. Other members include representatives of the food industry, sanitarians, federal and state agencies, land-grant colleges and the insecticide and fungicide manufacturers. The report states that considerabe information on the new organics is being accumulated, and that by the second week of August, more than 200 abstracts had been made.

Entomol. Congress Meets at Stockholm

By Dr. Ernest N. Cory

THE Eighth International Congress of Entomology was held in Stockholm, Sweden, beginning August 9th at the Concert House. Some 510 delegates were in attendance. The large theater was filled to capacity at the opening session to hear the Prime Minister of Sweden, T. Erlander, who pointed out of the importance of entomology to Sweden and the world at large. Dr. Tragardh, internationally known forest entomologist, now retired and devoting his time to the study of mites, discussed the antiquity of insects, pointing out that they appeared on the earth some 4 or 5 million years ago, while in comparison, man could be said to have arrived "yesterday." Pointing out the lessons to be learned from the social insects, Dr. Tragardh said, "I am sure that if man had studied the social insects more thoroughly, human society would have progressed more quickly."

Two hour lunch periods at notable institutions and trips by train and boat to places of interest furnished diversion from paper-reading sessions. August 11th was devoted to the ancient University of Upsala and to nearby Hammerby, the home and work shop of the noted Swedish naturalist, Carl Linné, the father of the present usage in binominal nomenclature of scientific names for plants and animals.

At the general session, Walter Ripper of Cambridge, England, described the organization which he has developed under the title of "Development of an entomological industry in Britain and the British Commonwealth." This was considered to be of interest to American industry since it presents an approach to the problem of control of insects quite different from our Federal and State aid to farmers, commercial interests and householders.

As a private concern, Mr. Ripper has developed a service for the protection of crops by the best known methods and insecticides on a contractual basis. His company, shares of which are held largely by the entomologists in his employ, has subscribers on an annual fee basis which assures them of expert advice on the extent of infestation, probable loss and the best treatment when necessary under the advice of competent entomologists. Equipment, such as helicopters, conventional ground equipment and high clearance tractors, developed by the concern are operated on a year-around basis by use in the northern part of the hemisphere during its summer and then moving to South Africa for its summer season. Most of the individual crop acreages are small and the helicopters are operated with a clearance of about three feet over the crop. Insurance for crop damage is carried by the company. Its scope of operations has been expanded by 70% annually since it first began to function. It formulates most of its own insecticides, using considerable amounts of DDT and benzene hexachloride.

Dr. B. Uvarov of London, the eminent specialist on migratory grasshoppers discussed the need for fundamental research on the ecology of the environment of initial swarming. Weather, both local and general plays an important part in the migration of grasshoppers to new pastures, he pointed out. He expressed the belief that more fundamental work should be done along with practical and insecticidal research to insure adequate control in the future.

Dr. V. B. Wigglesworth of Cambridge, England, the foremost insect physiologist, discussed the structure and development of the epicuticle of insects and its relation to body water loss. This has a very practical bearing on insect control as it has been shown that any abrasive in an insecticide, or a solvent of the cement and wax coating that covers all insects will hasten water loss and will result in the death of the insect.

Dr. V. Butovitsch who has succeeded Dr. Trojardh in the Swedish forestry work, showed pictures and described the operations in Sweden in control of leaf-eating pests by application of DDT by helicopter. The rough terrain makes the use of conventional planes more difficult, but the helicopter which is flown from 3 to 30 feet above the treetops is considered to be ideal. A large amount of forest dusting has been accomplished which is to be expected because of the importance of Sweden's forests commercially.

The importance of the common cock chafer both in the carnal and adult stages has led to a large scale research and control program by the French Ministry of Agriculture. The cock chafer, *Melalontha melalontha L.*, is to continental agriculture what the common white grub is to certain areas in the United States. Dr. Robert Regnier of Rouen, France discussed the biological research, the surveys on the basis of which three distinct year broods have been set up and the use of materials as additions to the soil for carnal control. They are using DDT, BHC, SPC (Sulphur of Polychlorocyclotoxane) and SNF (a group of mixed phosphoric esters—presumably close to Parathion).

Dr. H. L. Haller, B.E.P.Q., U.S.D.A., discussed the newer insecticides. As a subject of particular interest of Sweden, Denmark and Germany, Dr. O. Hespeler of Luebeck, Germany, discussed the ravages of the old house beetle *Hylotoupes bajulus*. In the U. S. an occasional board is injured by the species, but Europe sees roofs collapsing as the result of the feeding. "Xylamon," a chlorinated naphthalene and "Osmol WB 4," new commercial preparations, are being used in Germany. In Sweden besides the first chemical, heat treatments have been used where spraying could not be effectively or economically applied. The organization, known as Anticimex of Stockholm, led by Capt. Olof Strid, has used the heat method and has developed portable heaters with which they maintain a temperature of approximately 200°F. for a period of 24 hours.

Of the eleven sections into which the subject matter of the Congress was divided, five were devoted

to economic entomology with a total of approximately 75 papers. Many of the papers in the applied sections were general discussions and reports on biological investigations of little immediate interest to American entomologists. On the other hand, there were many reports of fundamental studies in physiology, morphology, zoogeography and embryology, that will undoubtedly have much bearing on the general science of entomology.

•

Application Group Meets

The National joint Committee on Fertilizer Application was scheduled to hold its annual meeting at the Gibson Hotel, Cincinnati, Ohio, on September 7, in conjunction with the annual meeting of the American Society for Horticultural Science. Appearing on the advance program were a number of technical papers to be presented at the meeting. These included "Work of the National Joint Committee on Fertilizer Application in Relation to Horticultural Science," by A. L. Schrader, Maryland Experiment Station; An Evaluation of Fertilizer Practices on Tree and Small Fruit Crops," by W. P. Judkins, Ohio Experiment Station; " An Evaluation of Fertilizer Practices on Vegetable Crops," by J. B. Hester, Campbell Soup Company.

Also, "The Role of Radioactive Isotopes and Other New Techniques in Evaluating Fertilizer Practices," by L. A. Dean and G. A. Cumings, Department of Agriculture; "An Application of Nutrients to the Above-Ground Parts of Plants to Correct Deficiencies," by D. I. Arnon, California Experiment Station, and "The Soilless Culture Method of Supplying the Nutrient Requirements of Plants," by O. W. Davidson, New Jersey Experiment Station.

In addition, there was planned to be a panel discussion on "The Role of Legume and Non-Legume Cover Crops, and Sod and Hay Crops, and their Fertilization in Rotations to Improve Soil Structure and Fertility." The leader of the panel was to be Kirk Fox, editor of *Successful Farming*. In addition to Mr. Fox, names of the following appeared on the advance program for the panel: B. A. Krantz, North Carolina Experiment Station; D. R. Dodd, Ohio Experiment Station; E. H. Tyner, West Virginia Experiment Station; G. N. Hoffer, American Potash Institute; J. D. Warner, North Florida Experiment Station; G. R. Muhr, Minnesota Valley Canning Company; H. H. Tucker, Coke Oven Ammonia Research Bureau, and M. H. McVickar, National Fertilizer Association.

Plans New Sulphur Plant

Texas Gulf Sulphur Co. has announced that it soon will build a sulphur processing plant at Worland, Wyoming. Final contracts had not been let late in August, and the company stated that cost estimates were incomplete. However, the new plant is expected to process some three million cubic feet of sour natural gas per day, and to produce 2 to 3 long tons of sulphur daily, starting in May, '49.

ACS Discusses Chemicals for Agriculture

AMERICAN Chemical Society has scheduled three separate meetings for its 1948 convention. The first was to begin in Washington, D. C., August 30, continuing through September 3. Second was scheduled for St. Louis, Mo., from September 6-10; and the final gathering for September 13-17 at Portland, Oregon.

The division of Agricultural and Food Chemistry was to hold its sessions at Washington, on August 30, and the Fertilizer Chemistry Division was to meet the following two days, also in Washington.

On the advance program as announced by the ACS, were discussions on weed killer materials, aerosols, fungicidal materials, and the new insecticides. The following speakers and their subjects were listed:

Ed. Witman, "2,4-dichlorophenoxyacetic acid;" R. L. Weintraub and A. G. Norman, "Plant Growth Regulators;" R. A. Fulton and S. A. Rohwer, "Liquefied Gas Insecticidal Aerosols;" H. L. Haller and Ruth L. Busbey, "Chemistry of some Newer Insecticides;" C. J. Krister, "Advantages of Methoxychlor as an Insecticide;" S. E. A. McCallan, "Fungicidal Action of Copper and Sulfur;" D. L. Schoene, H. Douglas Tate and T. W. Brasfield, "Quinones and Fungicides;" and R. O. E. Davis, "Fertilizer Research in the U.S.D.A."

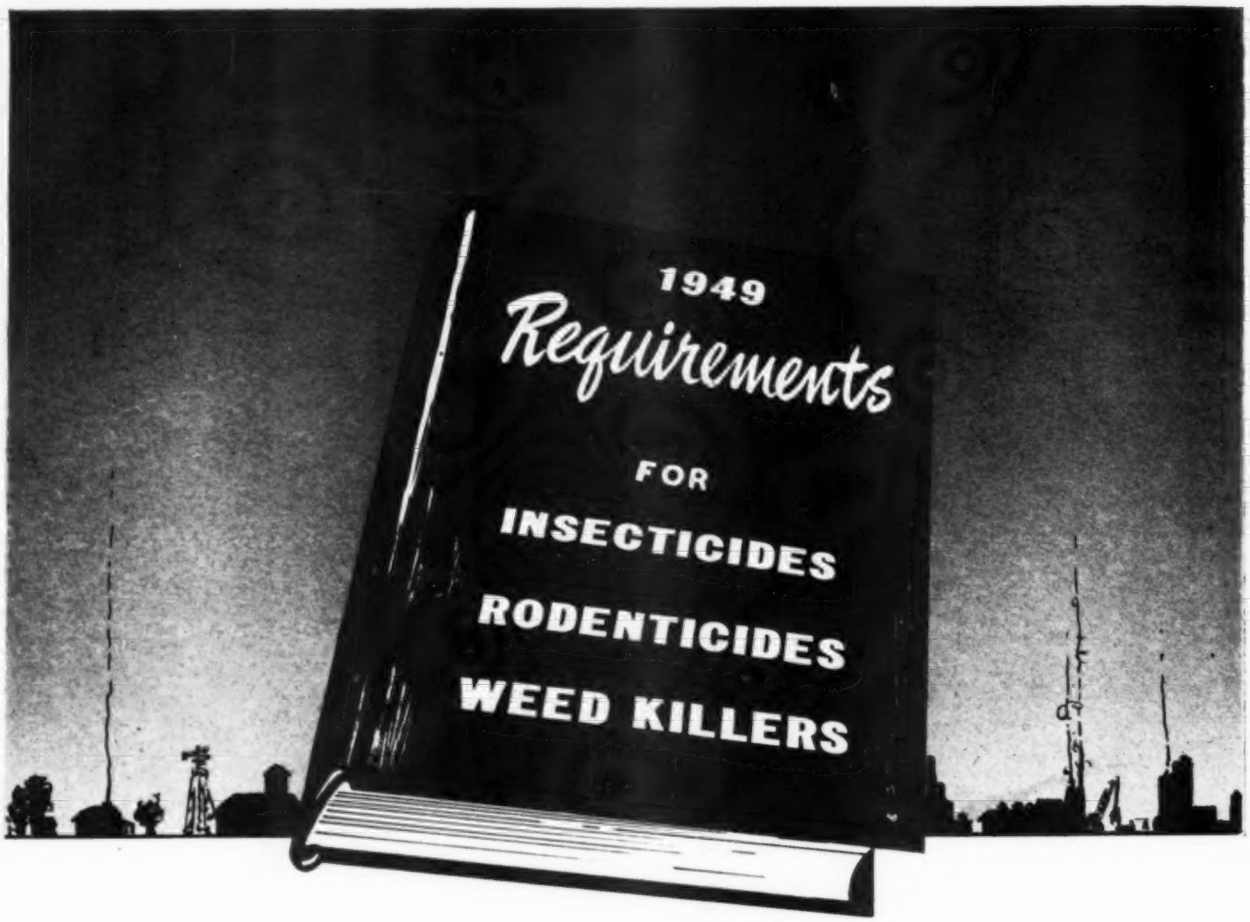
Fertilizer Div. Meets

TWO days' program was mapped out for August 31 and September 1 at the Hotel Annapolis, scene of the ACS Division of Fertilizer Chemistry. Dr. Jackson B. Hester, Campbell Soup Company agronomist, and Dr. Vincent Sauchelli, Davison Chemical Co., Baltimore, were to preside at the various sessions.

A symposium on the mining and processing of phosphates and their use in agriculture was scheduled, and a number of papers were to be presented. According to the advance schedule, these included "History and Progress of Phosphate Flotation," James A. Barr, Jr.; "Processing of Phosphate Rock," by T. L. Wilkerson; "Modern Trends in Superphosphate Manufacture," William T. Doyle; and "Phosphate Processes at Trail, British Columbia," by James Atwell.

After the luncheon period, at which F. S. Lodge and J. E. Breckenridge were to talk, the paper reading was to continue as follows: "Current Trends in the Use of Rock Phosphate for Direct Application," by T. R. Cox and M. V. Bailey; "Preparation of Radio-Active Phosphate Fertilizer for Plant-Utilization Tests by Tracer Methods," by W. L. Hill and E. J. Fox; "Studies of the Nutrition of Plants Using Radiosulfur," by M. D. Thomas, R. H. Hendricks and G. R. Hill; and "The Fate of Phosphate Soil Supplements," by Dr. Hester.

The General Session was to continue on September 1, with papers including "Stability of 2,4-D in Mixed Fertilizers," by Paul C. Marth and John O. Hardesty; "Some Practical Considerations in the Addition of Micro-Nutrients to Fertilizers," by Geo. H. Serviss; and "Use of Commercial Fertilizer in Vegetable Production," by Dr. Benjamin Wolf.



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Hudson Names Miller

Hudson Equipment Co., Chicago, has announced the appointment of A. E. Miller as manager of the firm's Columbus, Ohio, branch. Mr. Miller has been associated with the company for many years.

GRAIN PROTECTION

(*Continued from Page 39*)

to find any living insects.

Insects on Lake Boats

THE storage of grain afloat is a practice which has been employed on the Great Lakes for a considerable number of years. The customary procedure is for the boats to load with grain at Fort William in late November or early December and then proceed to destination and tie up alongside one of the elevators on the Great Lakes. The cargo is unloaded during the winter or early spring prior to the opening of lake navigation.

In pre-war days, some complaints arose through the infestation of winter cargoes particularly with grain mites. When it was decided to make extensive use of winter storage on boats to augment the elevator storage, a program of lake boat inspection was instituted. All of the hold space was examined, and the grain debris and sweepings were removed and destroyed.

The boats were examined shortly after arrival in port, and if in satisfactory condition, a loading certificate was issued. If cleaning were necessary, the first officer was advised of the work required and the boat was re-inspected before a loading certificate was issued.

As soon as the requirements were understood, many of the boats were thoroughly cleaned while making the trip up the Lakes so that a certificate could be issued at the time of the original inspection. This enabled the boats to load grain with the minimum amount of delay.

It is interesting to note that there was not a single complaint of infestation on the 816 grain cargoes stored on boats during this period.

Part II of this article will describe chemical control of numerous insect pests on ships, storage bins, and on farms. Watch for part II in the October issue.—ED.

GUEST EDITORIAL

(*Continued from Page 23*)

and reduced waste.

No means exist by which we can accurately measure the substantial gains resulting from the larger control effort undertaken as a vital part of the conservation program. Yet the testimony of members of this Association, of farm authorities, and of the farmers themselves clearly indicates that overall agricultural pest control was both intensified and extended.

And now we read crop reports pointing to new records in the making. A corn crop of at least 3.5 billion bushels, for example. We know that industry's products were used in increasing volume to protect corn this year; it seems logical to assume that this increased protection has made some contribution to the predicted record-breaking crop. The July 1 crop report of the Bureau of Agricultural Economics noted, with respect to the

for the Veterinary Market...

Chlordane insecticides (emulsions and wettable powders) are preferred by your customers because they are:

1. ***Effective*—against many of the hardest-to-kill external livestock parasites including sarcoptic mange-mites, most species of ticks, lice, fleas and flies.**
2. ***Pleasant to use*—have a mild, fresh, cedar odor.**
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4. ***Economical*—material costs range from 1½c a head to about 3c a head per application, depending on size of animals.**

Spurred by a strong advertising and merchandising campaign, the demand for Chlordane-based veterinary preparations is increasing daily. Formulators, distributors and dealers in veterinary products are invited to write us for details on use of Octa-Klor* Quality Chlordane in this field.

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corn crop, that more power cultivators were available "and the use of chemicals for weed control apparently was considerably increased." this trend augurs well not alone for the future of our industry; it is a hopeful portent for the welfare of agriculture.

Another 1948 development which is apraised with satisfaction by the industry is the initiation, by the AIFA, of a program designed to solve problems created by the use of the new organics. Questions bearing on toxicity, residues, proper use and related matters are the subject of study by special committees set up by this Association in cooperation with Federal and state officials, sanitarians, and representatives of the food industry. There is reason to believe that this program will do much to clarify the confusion resulting from the rapid introduction of new organic materials in the last few years.

Adjustments in the distribution of agricultural chemicals are normal industry practice, and 1948 was no exception. In the Cotton South, for example, the relatively light insect infestation curtailed use of industry's products. Yet industry was prepared to supply the chemicals in volume, had the need arisen for them. This is but one phase of the duced and distributed enough to meet the needs of American agriculture.

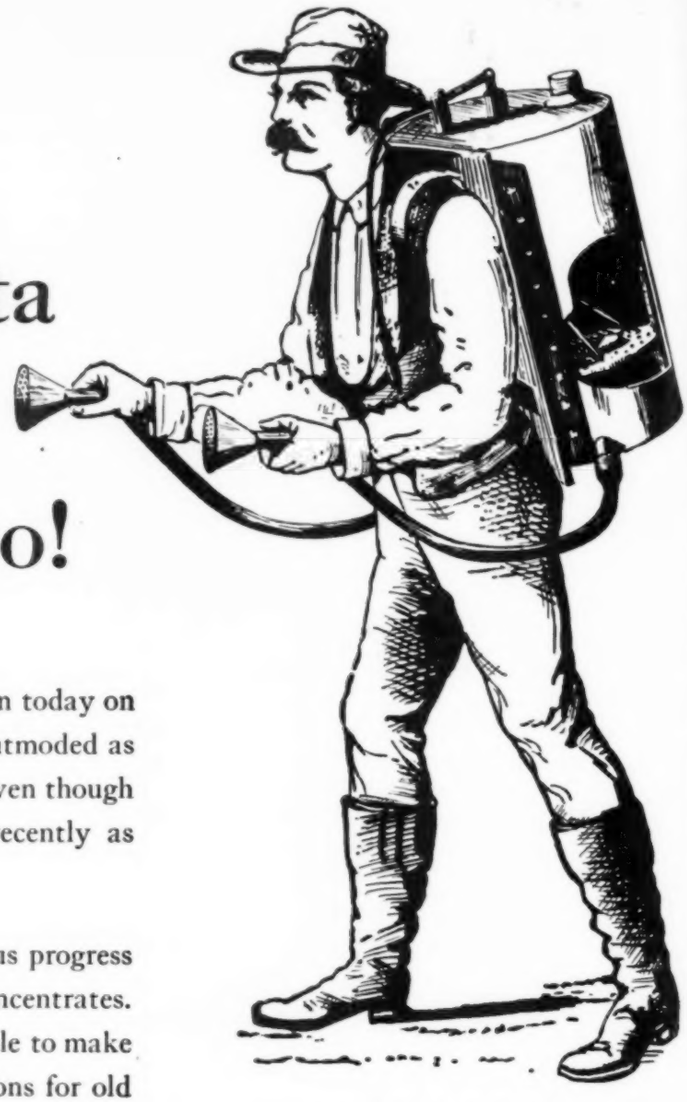
The supply picture this season was favorable. Overall, industry produced and distributed enough to meet the needs of American agriculture.

Legislation affecting the industry was the subject of continuing study by the AIF Association. A lack of knowledge about some of the new organic materials and their misuse in some instances led to the hasty adoption in one or two states of legislation which may prove to be detrimental to the public interest. Some legislation may have the effect of denying the use of highly effective new materials to careful and responsible growers.

This situation prompts reiteration of our Association position that education must be given increased emphasis, that legislation alone is not the solution of any hazards involved in the production, distribution and application of pest control materials. Now as in the past, the industry is working in close association with Federal and state regulatory and control officials on this important problem.

Events of this season, although touched on but lightly in this report, give substance to the hope that the industry in the years ahead may enlarge and strengthen its areas of service to agriculture and to the nation. It may be accepted as a fact that the control of insects, plant diseases, and weeds will become an increasingly important activity in the field of agricultural production and conservation. Chemical pest control is certain to be expanded in the years ahead. The world is desperately shortly of food and fibre; unhappily, that appears to be the world outlook for some time to come. In this circumstance, the opportunity for larger service by this industry is obvious.

Emulsion Data May be Outmoded, Too!



Hodel and Stauber's Garden Sprinkler—an 1878 engraving from Bettmann Archive

Much of the literature in circulation today on emulsions and concentrates is as outmoded as this sprayer of seventy years ago, even though it may have been published as recently as three to five years ago.

With the march of time, tremendous progress has been made in emulsions and concentrates. New materials have become available to make possible vastly improved formulations for old toxicants as well as new.

Atlas has information available for you in an easy-to-read pamphlet. It is concise and informative—with latest up-to-the-minute ideas on emulsions and concentrates. Write for your copy today.

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Industry will meet this challenge of the days ahead, just as it measured up to its responsibilities of the recent war, and of its earlier and formative years. In this effort, industry will have the continuing benefits of representation by the Agricultural Insecticide and Fungicide Association, which this season marks its fifteenth year. The next fifteen years, we may be sure, will bring to the industry and to the AIFA even larger opportunities for service. This is perhaps the most significant lesson to be learned from the experience of this 1948 season.

EXPERIMENT STATIONS

(*Continued from Page* 26)

ment Stations the speaker cannot speak authoritatively, since they are all autonomous institutions with various historical backgrounds and varying policies. However, from the standpoint of the California Station, we welcome aid and cooperation from commercial organizations whose aims and ideals are similar to those of the Station.

Commercial cooperation is welcomed in the form of grants-in-aid for our research to facilitate work which we believe should be undertaken. The right of the donor to consultation and complete knowledge of the progress of the investigations at any time is respected. We would refuse to enter into any cooperative investigations of the efficacy of any materials the constituency of which was unknown to us and we would reserve the right to publish the results whether they were favorable or unfavorable to the products in question.

This is certainly a reasonable agreement considering that ordinarily the grant simply covers the salary of a research assistant and possibly a small amount for expense and equipment, whereas the University is expending even more in terms of directing the staff members' time as well as overhead and equipment costs to undertake the work.

It is entirely rational that agreements relating to research based on *new* and undeveloped chemicals should include provisions for the recognition of participation by industry in patent rights stemming from investigations carried on by the Station, that were not already covered by the donor of the grant. The Experiment Station supplies the direction of the experiments involving the part-time energy of one or more relatively high salaried staff members, as well as the consulting activities of specialists from the entire University and the use of all the necessary equipment that is available; in short, for every thousand dollars of contributed funds there is involved several times the expenditure of University funds. This is stated merely in explanation of why it is impossible to accept an unlimited number of grants and why the University is being reasonable in refusing to recognize the donor as the *sole* owner of patent rights developed in the course of the investigation. Frankly, we had rather accept a grant for work on a promising material

(*Continued on Page* 67)

"Spit tobacco juice, or die"

DNOC (dinitro-orthocresol)

may banish grasshopper plague

To millions of kids a grasshopper may be just a quaint "bug" which "spits tobacco juice" or makes passable bait for fish hooks. But to others all over the world, grasshoppers are destroying pests which annually devour millions of dollars worth of food crops.

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that is so thoroughly covered by patents that no secrets are involved and where the possibility of new patent rights is negligible. The speaker knows no case where Experiment Stations have sought to block basic patents by patenting details of manufacture, use or formulation that would be embarrassing only to the holders of the basic patents.

The term "contractual research" is a coined phrase used to describe research donations designed to expand and augment insecticidal work of the type that the Station would have undertaken on its own initiative had funds been available. The distinction between this type of research and that mentioned under new chemicals is that in this case the Experiment Station is in no way dependent on the donor for the contribution of new products. For instance, under this category a donation might be accepted for the expansion of an investigation relating to the use of cryolite in the control of the walnut husk fly. To be still more specific, in 1943, an opportunity to cooperate with the sole manufacturer of DDT would have been listed under new chemicals—today it would be cataloged under the present heading. Under this category the Experiment Station should realize no patent rights on the part of the donor and probably should exercise none of its own initiative except for the protection of growers. In addition, the Experiment Station should exercise considerable judgment and caution in accepting donations of this type in order to avoid overemphasis on phases of its work that might become too heavily subsidized at the expense of perhaps more important sectors that lacked an aggressive sponsor.

Despite that fact that such activity is disclaimed as research, it is realized that the program of the experiment stations must keep abreast of commercial developments by doing some screening and testing. However, if this could be reduced to the minimum and added emphasis and support made available for basic toxicological, ecological and taxonomic work, to the end that we might plan agricultural chemicals intelligently, enormous sums could be saved by eliminating thousands of screening tests.

Facilities At Hand

THE job ahead to bring about this millenium is a challenge to all entomologists, plant pathologists and specialists in herbicides. The State Experiment Stations, if they have the cooperation of the chemical industries, have perhaps the best prognosis for success because of the help in all sorts of allied fields of interest and aid which range from the folk-lore studies in anthropology to the radioactive tracer materials from the radiation laboratories that are available to the in a great University. However, the stations have no monopoly. The great laboratories and facilities of the federal government should be marshalled behind a battalion of federal workers whose sole responsibility should be the concerted attack on these principles of toxicology.

Furthermore, the great chemical companies are still doing extensive

development work in ultra-modern laboratories, well-manned by trained biologists and chemists. Their primary function is screening and testing the multiplicity of possibly useful products that can be produced. The speaker affirms, however, that the determination of just one facet of information of how a particular chemical enters the cells of a plant or animal would be of infinitely more benefit to mankind and amass many times the financial savings to the company than literally thousands of empirical trial runs.

For the moment, in order to meet the critical situation now being faced in field practices, testing must be utilized as our only safeguard. Any steps that can be taken to gather and circulate the results and thus avoid duplicating trials will be most helpful. We are attempting to do this in the eleven western states' experiment stations under a cooperative arrangement. Some of our difficulties, however, are inherent in the multiplicity of formulations. Even with the same active ingredient, the chances are remote that the dosage, diluent and form of the material, whether a wettable powder, dust or spray, would be constant in two different experiment stations, thus we are still left with only empirical information of doubtful value except under the particular conditions where the experiment was performed.

Furthermore, in conclusion, it must be admitted that this plea for wide-scale basic research to elucidate the principles governing the action and formulation of the new organics, even if accomplished, would still leave much testing to be done. Even when prescriptions can be written for agricultural chemicals, the competition between manufacturers will still require the addition of those "priceless ingredient" to capture the imagination and incidentally, the sales of growers eager to purchase the "insecticide to end all insecticides. However, household fly spray used to be sold in North Africa years ago in carnation, violet and heliotrope scents and they were all equally effective and equally harmless. It is to be hoped that once the ideal formulations for specific insecticides, fungicides and herbicides are established, the fantasies that seem to overwhelm sales managers and advertising copy will be equally innocuous.★★

INSECT SURVEY

(*Continued from Page* 49)

western Maryland, southern Indiana and southern Illinois. Infestations of the Pacific mite were increasing in the Yakima Valley of Washington toward the end of July.

The pear psylla was causing damage during the last half of July in poorly sprayed orchards in the Hudson Valley of New York. About the middle of July it was reported rather widely distributed in pear orchards in the Wenatchee Valley of Washington, but not in sufficient numbers to cause damage. In July

frianite

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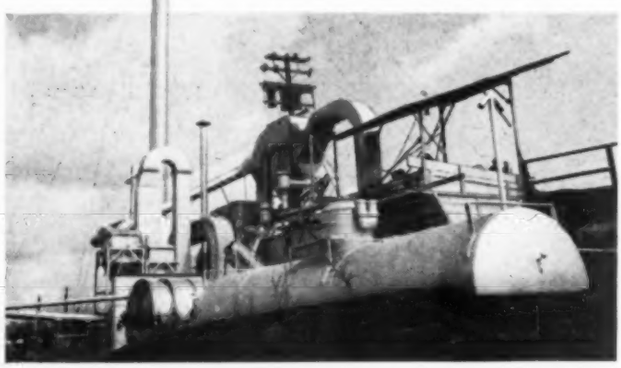

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this insect was discovered for the first time in Missouri, at Columbia.

New Fruit Pest?

AN apparently new fruit pest was reported during July from the Yakima Valley of Washington and from southern Idaho. Larvae of this as yet unidentified lepidopterous pest have been found attacking cherries, apricots, peaches, and prunes.

Infestations of the Mexican bean beetle appear to have been somewhat lighter than usual throughout many areas in the eastern part of the country. Moderate to heavy infestations were reported from parts of Virginia and northwestern Tennessee. The potato leafhopper continued to cause serious injury to beans in parts of New York, New Jersey, and Ohio. Lighter infestations prevailed in Virginia and Tennessee. Toward the end of July, thrips were reported heavily infesting beans in Idaho and California. Lygus bugs were numerous on lima beans in the Santa Paula district of Ventura County, California, and the lima bean pod borer was causing serious damage to a large acreage of that crop in the same district.

The potato psyllid appeared to be causing somewhat more damage than usual to potato and tomato during late July and early August in parts of Nebraska, Wyoming, and Colorado. The tuber flea beetle was also numerous on potato in those States.

Cabbage caterpillar infestations were generally light to moderate during late July and early August throughout the eastern part of the country, and in Idaho, Utah, and central Washington.

Serious infestations of the beet webworm on sugar beets occurred during the last half of July in northern Utah, the upper Snake River Valley of Idaho, and the Arkansas River Valley of Colorado. Lighter infestations were reported from south-central Idaho.

The onion thrips caused serious damage to onions in Utah and Idaho during the last half of July. The insect was present in moderate abundance in Wisconsin and California, but appeared to be increasing in Wisconsin during early August.

The pea aphid outbreak in the Palouse district of Idaho-Washington continued serious until the latter part of July, but had practically reached an end by early August. Pea aphid populations in Maine, though relatively low, were increasing rapidly on peas shortly after mid-July as harvest was starting.

Aphid populations were on the increase on a variety of crops in New York toward the end of July. Aphids on potatoes were on the increase in Maine early in August, especially in untreated fields. The tomato aphid was numerous on tomato in the vicinity of Columbus, Ohio at that time.

During the last half of July the aphid infestation on shade-grown cigar tobacco ranged from light to severe in the Connecticut River Valley of Connecticut and Massachusetts. A general aphid infestation

was also present there on the sun-grown cigar tobacco. No serious aphid infestations on tobacco were reported from Maryland. Aphid infestations on tobacco increased considerably during the last week or 10 days of July in South Carolina and Tennessee, with light to moderate injury occurring in many fields. Infestations were on the decrease in early August in northwestern Tennessee and Wisconsin tobacco fields were generally infested with aphids at that time.

Boll weevils were on the move by the end of July and infestations had increased throughout most of the infested territory. Heavy infestations were reported from many counties of Texas, Oklahoma, Arkansas, Louisiana, Mississippi, Alabama, Florida, Georgia, and North and South Carolina. By early August the insect had reached its peak in most areas and was damaging green bolls.

Serious infestations of the bollworm were reported from the northern two-thirds of Texas by the third week of July, but the infestation decreased thereafter. Little, if any, injury by the bollworm was reported from the eastern part of the Cotton Belt.

By the middle of August the cotton leafworm had been reported from 10 counties in Texas, (Refugio, Hidalgo, Calhoun, Jackson, San Patricio, Victoria, Maverick, Matagorda, McLennan, and Falls, and from 3 counties in Florida, (Marion, Alachua, and Lake).

Infestations of the cotton fleahopper have been generally low. About 4,000 acres of cotton in Dunklin County, Missouri were dusted for control of this pest.★★

LABELING

(*Continued from Page 45*)

thoroughly with soap and warm water before eating or smoking. Wash all contaminated clothing with soap and hot water before re-use.

Although parathion formulations have been reported effective against a wide variety of pests, the dangers inherent in their use require careful consideration in each particular use. On the basis of information available at present, objection is not being raised to directions on properly formulated products to be used as follows:

For 15% Wettable Powder

Mites on apples—½lb. in 100 gallons of spray, not more than 2 sprays per season, and not later than 30 days before harvest.

Mites on pears—½lb. to 1lb. in 100 gallons of spray, not more than 2 sprays per season and not later than 30 days before harvest.

Wooly aphis on apples—1 lb. in 100 gallons of spray as an early grow-season spray.

Mealy bugs on apples and pears—1½ lbs in 100 gallons of spray, 1 or 2 sprays applied not later than 30 days before harvest.

Bud moth on prunes—2 lbs. in 100 gallons of spray, not to be used between jacket period and harvest.

Cottony scale on peaches—2 lbs. in 100 gallons of spray for crawlers only. Not to be applied within 30 days of harvest and not over 2 applications.

Two-spotted spider mite and Mexican bean bettle on beans—1 lb. in 100 gallons of spray, not be applied within 30 days of harvest or after blossom fall, whichever is earliest.

Aphids on tomatoes and carrots—1 lb. in 100 gallons of spray applied not later than 30 days before harvest.

Aphids, red spider and white fly on ornamental plants and nursery stock (outdoors only)—½ to ¾ lb. in 100 gallons of spray.

Mealy bugs and leaftiers on ornamental plants and nursery stock (outdoors only)—1 to 1½ lbs. in 100 gallons of spray.

For 1% and 2% dusts

Cotton aphid on cotton and walnut aphid on walnuts, not more than 2 or 3 applications.

It should be realized that this is only suggested as a guide to manufacturers in preparing labels for products to be registered in California, and that there may be necessary changes as further information becomes available. Many experimental men are of the opinion that another season is needed to determine whether continued work by spray crews will be injurious to them, and what, if any, spray residue may be involved at harvest or in processed foods. Each new insecticide brings its own special problem and some farmers are now claiming that they must have parathion to take care of red spiders and mealy bug, which are claimed to have increased tremendously due to the use of DDT. It would seem well to go slowly on parathion until we find out what it will do in commercial application.

Conclusion

THE decision covering registration and labeling of new economic poisons places a heavy responsibility on the enforcement official and sometimes it would appear that he is actually recommending or approving a product. This is not the case, as the seller is responsible for his claims. When a new product is developed, the manufacturer carries on enough experimental tests to indicate that the product has value in pest control. At the same time he should have carried on studies with regard to toxicity to spray operators and possible spray residue hazards if the product is to be applied to edible portions of crops. Much of this experimental work is under the direction of entomologists either employed by government or industry and, as more and more of the new products are developed, it be-

comes clearer that the responsibilities of the entomologist are increasing. In developing use of a new insecticide, he must consider all the effects that will be involved in the use of the product. He cannot stop with just a report that it gives satisfactory, or excellent, or supreme control of a particular pest, but must consider whether there is any injury to the host plant on which it is applied; whether there will be any toxic effect through repeated applications in following years, such as soil poisoning; whether there will be any spray residue that will affect later operations in handling the crop, such as picking; whether there will be spray residue at harvest time that cannot be removed; and finally, whether there will be any effect if the particular crop is to be canned or processed in another manner. The economic poisons enforcement official looks to the entomologist for the answers to these questions. Data for some of the products now on the market should be developed before a stampede for another new one is encouraged.★★

FERTILIZER

(*Continued from Page 29*)

considering many factors. In states where a soil analysis service or public testing program is maintained, farmers should be urged to avail themselves of that service. Soil tests supply useful information regarding the degree of soil acidity and the need, if any, for liming in order to grow certain crops, especially legumes, successfully. Other soil tests that attempt to measure the need for particular plant foods, as phosphoric acid or potash, may also be helpful when interpreted by a person with broad knowledge of the soils of the region and their responses to fertilizer treatment. The State specialists usually have these qualifications.

Many plants exhibit characteristic symptoms when certain plant foods are not available in adequate amounts. To give a few examples: when crops are paler green than normal, nitrogen deficiency is probable; the firing of lower corn leaves may point to lack of nitrogen or potash; while the purple color sometimes seen on certain strains of corn may indicate lack of phosphorous. For further details on corn and other crops and for deficiency symptoms of magnesium, boron, copper and other elements see the reference "Hunger Signs in Crops." It is often advisable to have a qualified technologist check observed deficiency symptoms by means of tissue tests where this service is included in the public testing program. Crops are often stunted and yield poorly through lack of plant food without showing the characteristic symptoms. Top dressing with the deficient plant food will sometimes save a crop but it is often too late to be most effective when symptoms appear. The symptoms are, however, a guide to the fertilization of subsequent crops. Other guides of fertilizer needs are the level of previous crop yields, the degree to which crop residues are returned to the land and nature of the soil.

Application Methods

FERTILIZERS are applied in several different manners depending on the crop and the soil. For the best method suited to a particular situation consult your county agent or extension worker. *Broadcasting* over the entire soil surface may be done either before or after plowing. This is usually a relatively inefficient method. When fertilizer is broadcast after a crop is growing without working into the soil it is often referred to as *topdressing*. Fertilizer may be placed in bands at a desired depth in the soil after plowing by *deep drilling* as with a disc type of drill. In *side dressing* the fertilizer is applied along the crop rows. Such nitrogen fertilizers as ammonium nitrate and sodium nitrate are often applied in this manner. In soils that leach readily it is often desirable to apply only a part of the nitrogen at planting time and then to side dress with more nitrogen later. Many row crops are so treated. In the *plow sole* method the fertilizer is placed on the bottom of each furrow. Heavy applications may be made in this way and it is said that the resulting deep placement stimulates root growth. *Drilling with the seed* is a method sometimes used for small grains and corn. The fertilizer and seed should not be mixed before applying but should be applied from separate hoppers. The seed must be able to tolerate contact with the fertilizer and this factor tends to limit the rates of application permissible by this method. *Band placement* is a favorite method for row crops, especially truck crops and cotton. The fertilizer is usually placed, by means of a properly designed machine, in bands two to three inches to the side of the seed and one or two inches below. A single band may be used or bands on either side of the row may be employed. *Bedding* means applying the fertilizer in the bottom of a trench and mixing or covering with soil before planting the seed. This method was formerly used for cotton.

Ammonia is sometimes dissolved in irrigation water, or by means of special equipment it may be applied directly to the soil. The latter practice is becoming widespread in certain areas in the South. *Starter solutions*, made by dissolving soluble fertilizers in water, are sometimes used for watering transplants. A pound of 5-10-5 may be dissolved in 5 gallons of water and ½ pint used for each plant. Some of the fertilizer may not dissolve but most of the plant food will be present.★★

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Theory and Practice in the Use of Fertilizers. Firman E. Bear. John Wiley and Sons, Inc., New York, N. Y.

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Gustafson. Orange Judd Publishing Co., Inc., New York, N. Y. 172 pages, 1939.

Our Land and Its Care. Published by the American Plant Food Council, Washington 6, D. C. in cooperation with the Agricultural Education Service, U. S. Office of Education, Federal Security Agency, Washington, D.C.

Ammonium Nitrate for Crop Production. Colin W. Whittaker, Bailey E. Brown and J. Richard Adams. U. S. Department of Agriculture Circular 771, 28 pages, Feb. 1948.

Growing Vegetables in Town and City. Victor R. Boswell and Robert E. Wester, U. S. Department of Agriculture Miscellaneous Publication 538, 40 pages, January, 1944.

CATTLE LICE CONTROL

(*Continued from Page 34*)

on range cattle. Treated animals made an average net gain of 75 pounds per head over untreated check lots, under identical management, range, and handling conditions during a period of 61 days.

2. The lowest concentration of "Pyrenone" employed without any additional insecticide ingredients, was 37.6 mg. piperonyl butoxide with 2.4 mg. pyrethrins in 100 ml. This spray as well as higher concentrations, consistently gave initial kills of all motile stages of all species of lice on cattle.
3. Dilutions of 12 mg. butoxide and 0.6 mg. pyrethrins in combinations with 60 mg. DDT, with and without 2-½ pounds of wettable sulfur per 100 gallons, gave practically complete kills of motile stages and effective practical control for 60 to 90 days. With 0.25% DDT the initial kill was complete and the period of louse protection was increased to over 4 months.
4. For combined control of cattle grubs and lice the addition of 100 mg. piperonyl butoxide with 5 mg. pyrethrins per 100 ml. to a suspension composed of 5 pounds of 5% cube powder per 100 gallons (30 mg. rotenone in 100 ml.), consistently resulted in 100% initial kill of lice and in practical protection against lice for the entire season.
5. By hand gun application a dust composed of 0.5% butoxide, 0.25% pyrethrins and 0.2% rotenone in 80% sulfur was slow in its initial kill but eliminated all motile stages of lice by the end of 30 days and afforded complete protection from a single application for the entire season.
6. Concentrations of 71 mg. butoxide and 3.5 mg. pyrethrins in 100 ml. of emulsion, also 100 mg. with 5 mg., eliminated motile stages of the little red biting lice in 5 days or less after application, and there was no subsequent development of this species in any of the field tests.
7. From the number of tests representing various conditions, the conclusion cannot be escaped that power sprays or dips containing 100 mg. piperonyl butoxide and 5 mg. of pyrethrins in 100 ml. of emulsion, is com-

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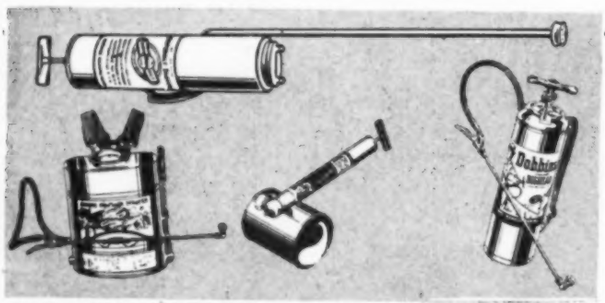

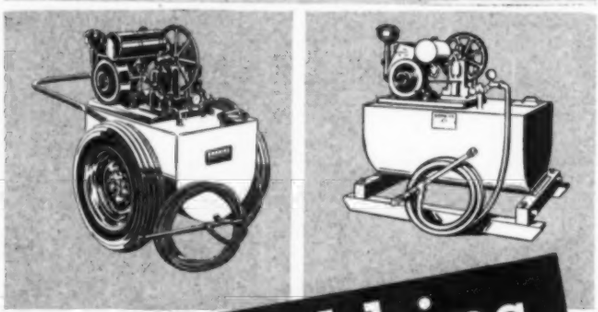

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Oils with a viscosity of 120 Saybolt or less cover the great majority of oils used in Dormant and Summer Sprays.

GENERAL TEXTURE

Mul-si-mo is a thin amber-colored oily liquid about the same viscosity as Kerosene Oil.

METHOD OF USE

There is nothing complicated about the use of *Mul-si-mo*. It is just poured into the oil to be treated at the rate of ½ to 1%, depending upon the tightness of emulsion desired—then thoroughly stirred—and the process is completed.

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Mul-si-mo is Neutral. Mul-si-mo-Made Emulsions are not adversely affected by pronounced saline, alkaline or acid re-acting waters.

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Mul-si-mo, we believe, is the cheapest and most economical Emulsifier on the market for the emulsification of the oils above specified.

NON-TOXIC TO PLANTS

Extensive tests have shown *Mul-si-mo* to be non-toxic to plants when used at a dilution of 1 to 100. (Plants used in tests —Coleus.) As summer oils are usually used at the dilution of half-gal. to 100 gals. water, at such dilution the rate of *Mul-si-mo* to water would be 1 to 20,000.

COST OF MUL-SI-MO

Per Gallon $4.00; 5 Gallons and up @ $3.75 per Gallon; 50 Gallon Drums @ $3.50 per Gallon, f.ob. New York or Jersey City. (Above prices for U. S. only. Foreign prices on request.)

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pletely effective against all active stages of all three common species of cattle lice present at the time of treatment.

8. One spray or dip application thoroughly applied with the above furnished practical louse protection throughout the season. Of more than 1600 beef cattle treated with the above dilution, seasonal control in excess of 2 months resulted in all cases, 97% of the individuals enjoyed complete practical louse protection for 85 days or longer, and 90% had no louse burden for 4 months or longer, as determinable by periodic examination of the available animals.
9. There was no significant difference between the efficiency of equal "Pyrenone" concentrations in water dispersible powders or in emulsions, but there was a preference for emulsions among the cooperators.
10. For initial kill of active stages of cattle lice on beef cattle, 25 mg. piperonyl butoxide and 1.25 mg. pyrethrins in 100 ml. or possibly lesser amounts are entirely satisfactory. Wettable sulfur, rotenone and DDT can be used with such concentrations with the indicated possibility of at least a slight increase in effectiveness.
11. When correctly applied by thorough power spraying or dipping, single applications of emulsions containing 100 mg. piperonyl butoxide with 5 mg. pyrethrins are entirely satisfactory for control of sucking and biting lice on beef cattle. There is a completely satisfactory initial kill of all active stages present at the time of treatment, and the extreme probability of practical protection from lice throughout the season when lice are normally a burden to animals.
12. Against the spinose eartick in cattle, individual ear treatments with approximately 2 ounces of emulsion containing 400 mg. piperonyl butoxide and 20 mg. pyrethrins are indicated for a very high degree of control.

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Dove, W. E. 1947. Control of pests on animals and about milk products. Jour. Milk & Food Tech. 10 (4).

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Wachs, H. 1947. Synergistic insecticides. Science 105: 530-531.

Industry Patents

2,444,905. PREVENTION AND DESTRUCTION OF WEEDS. Patent issued July 13, 1948, to W. A. Sexton, Manchester, England, assignor to Imperial Chemical Industries, Ltd., A composition suitable for destroying weeds comprising a carrier material and a compound selected from the group consisting of 2,4,5-trichlorophenoxyacetic acid and its water soluble salts, in amount sufficient to exert an herbicidal action.

2,445,757. METHOD of CLOSING BAG TUBE ENDS. Patent issued July 27 to Daniel Belcher, Minneapolis, Minn., assignor to Bemis Bros. Bag Co., Minneapolis. The method of closing and sealing an open end of a flexible walled tubular bag body, which consists in pressing the walls of the bag end into flatwise relation with the edge walls intucked between the side walls, retaining the contiguous edges of the flattened side walls in flatwise relation, outwardly bending the side walls along fold lines disposed in substantially parallel relation to the edge walls whereby portions of the intucked edged wall are unfolded to substantially right angular relation to the median plane of the bag body, engaging the marginal edge of the central portion of each edge wall and folding said wall portions into flatwise relations with their respective edge-walls and whereby portions of the edge and side walls are folded along diagonal fold lines to bring together the marginal edges of each edge wall and also the edges of the folded side wall portions, and subsequently folding a strip of sealing tape over all of the marginal edges of the side and edge walls and adhering it thereto, thereby to seal the bag end against leakage.

Trade Mark Applications

CASCO, in sans serif capital letters, for general chemicals including insecticides and fungicides. Filed Oct. 18, 1946 by Carrier-Stephens Co., Lansing, Mich. Claims use since Jan. 15, 1929.

GLOCIDE, in old style capital letters, for insecticides. Filed Dec. 10, 1947, by Geigy Co., Inc., New York. Claims use since Nov. 19, 1947.

BADGER BRAND FERTILIZER, in outline capital letters in square, with circular motif in center, showing farm scene. Filed Aug. 18, 1947 by N. S. Koos & Son Co., Kenosha, Wis. Claims use since Apr. 28, 1925.

THOMAS SOIL-RICH FERTILIZER, with words "soil-rich" in capital letters, and words "Thomas" and "fertilizer" at top and bottom, respectivelv. Filed Sept. 5, 1947 under section 2f of the act of 1946. Claims use since Mar. 3, 1941.

MONA PEAT MOSS, IRELAND. In circular form capital letters. For soil-conditioning peat moss. Filed Oct. 16, 1947 by Bord Na Mona, Dublin, Ireland. Claims use since Sept. 3, 1947.

WEEDAR, in sans serif capital letters, for chemical preparations for exterminating weeds. Filed July 29, 1947, by American Chemical paint Co., Ambler, Pa. Claims use since Dec. 28, 1946.

SLUG-EM, in heavy capital letters, for powdered insecticide for control of snails and cutworms. Filed Aug. 22, 1947 by Destruxol Corporation, Ltd., Pasadena, Calif. Claims use since Sept. 24, 1945.

BIOFOS, in sans serif capital letters, for chemical toxicants having insecticidal, fungicidal and rodenticidal utility. Filed Dec. 10, 1947, by Monsanto Chemical Co., St. Louis, Mo. Claims use since Nov. 13, 1947.

SYNKLOR, in heavy capital letters for insecticides. Filed Dec. 12, 1947, by U.S. Rubber Co., New York. Claims use since July 3, 1947.

ORTHO SCIENTIFIC PEST CONTROL, with word "Ortho" in large capital letters, and other words in reverse under it. For fertilizers. Filed Sept. 23, 1947, by California Spray Chemical Corp., Richmond, Calif. Claims use since June 3, 1946.

NYHOL, in sans serif capital letters, for anti-fungus and mold compound. Filed Dec. 28, 1946 by Master Mechanics Co., Cleveland, Ohio. Claims use since February, 1940.

SUPERTONE, in capital letters, for plant and horticultural parasiticides, insecticides, sprays, fungicides and hormones. Filed Jan. 13,. 1947, by California Spray-Chemical Corp., Richmond, Calif. Claims use since Nov. 27, 1946.

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Professor Metcalf Dies

Prof. C. L. Metcalf, 60, head of the department of entomology, University of Illinois, died August 21 at Urbana. He had been on leave of absence for the past two years because of ill health. He was a former president of the Entomological Society of America and was a native of Ohio.

•

Spencer to New Post

Frank H. Spencer has been named assistant administrator of the Agricultural Research Administration, it was announced recently by Dr. W. V. Lambert, agency head. Mr. Spencer has been in the service of the Bureau since 1917. He has been connected with the Bureau of Markets, the Division of Publications, and the office of the Secretary. Since 1931 he has been in charge of business management and administrative functions of the Bureau of Entomology and Plant Quarantine. He was appointed assistant chief of that bureau in 1941, and has continued in that capacity since. His new appointment became effective on July 1.

Succeeding Mr. Spencer as assistant chief of the B. E. P. Q. is Edmund Stephens.

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word. $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

Positions Open

Entomologist, horticulturalist or plant pathologist. Major Oil Company with an established insecticide marketing organization requires services of an agricultral college graduate with degree and three years practical experience in truck crops, forestry or nurseries. Not over 35. Duties will include advising growers and dealers on pest control problems and will involve traveling in New England after a suitable indoctrination. This is a salaried career position. Address Box 280 care of Agricultural Chemicals.

Manager Wanted: For new fertilizer plant in mid-west. Good opening for man of experience, in expanding section. Only man with production record need apply. All applications treated in strictest confidence. Address Box 287 care of Agricultural Chemicals.

Ph. D. Wanted: For research in the field of cellulose chemistry. Some industrial experience preferred. Southwestern location. Write R. R. Couch, Research and Development Department, Phillips Petroleum Company, Bartlesville, Oklahoma.

Salesman: National manufacturer of insecticides, fungicides and herbicides requires several new salesmen with cars to handle expanding business with wholesalers and dealers. Salary, expenses and bonus arrangement. Position permanent. Give experience, territory preferred, salary expected, etc. Address Box 281 care of Agricultural Chemicals.

Positions Wanted

Economic Entomologist: Employed by large company with good position, but desires change of location to Denver area. 20 years of experience and technical training in nearly all phases of entomology, U. S. Forest Service, Bureau of Entomology, commercial and industrial entomology, insecticide formulating, research and general insect and plant disease control from Rocky Mts. area to Pacific Coast. Well acquainted with entire area. Address Box 282 care of Agricultural Chemicals.

Salesman: Young man, 26, three years in sales of chemicals, solvents, aromatics for manufacturing organization desires new connection in sales department of manufacturer. College graduate. Interested in position with future possibilities. Address Box 283 care of Agricultural Chemicals.

Technical Writer: University training, broad background of practical experience, biology, agriculture. Editorial, salary. Address Box 284 care of Agricultural Chemicals.

Miscellaneous

For Sale: Odd lots for quick sale to clean up stock, 200 lbs. formulated sodium salt of 2,4-D; 300 lbs. amyl ester of 2,4-D. If interested, write to Box 285 care of Agricultural Chemicals.

Now Available: For insecticide manufacturers a small advertising agency technically equipped to create for you, everything from an individual folder to a complete advertising campaign. Experiencce with leaders in the field assures results for your products. Address Box 286 care of Agricultural Chemicals.

Equipment Wanted: Insecticide manufacturer needs additional equipment, must be in excellent condition, capable of doing exceptionally good work. One or two insecticide mixers, 600-800# capacity, and 1,500#-2,500# capacity respectively. Also small package machine, preferably automatic weighing type capable of handling 4 oz. to 15 lbs. per package, and small stapling machine, suction fans and cyclones for dust recovery, and allied equipment. Will buy from owners only; dealers need not apply. Address Box 554, Pahokee, Florida.

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New Miss. Nitrogen Plant

A new 13 million dollar nitrogen fixation plant for fertilizer is to be built as a farmer Co-operative at Jackson, Mississippi. The charter has been approved for the Mississippi Chemical Corporation which has been capitalized at 8 million dollars.

The new plant will produce 150 tons of ammonia per day, and nitric acid will be produced at the rate of from 225 to 250 tons daily. Owen Cooper of Jackson, is acting as chairman of the Committee on the Nitrogen plant for Mississippi.

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Monsanto Weed Killer

Monsanto Chemical Co., St. Louis, Mo., has recently published a bulletin on its product, "Santophen 20" weed killer. The product, pentachlorophenol technical, is toxic to weeds in low concentrations and does not result in accumulative soil sterilization, the bulletin states. "Santophen 20" is not soluble in water, and the bulletin presents a table of the solubility of the product in various oils.

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Gen. Shadle Honored

General Charles S. Shadle (retired), former Commanding Officer of the Rocky Mountain Arsenal, Denver, Colo., and now vice-president of Julius Hyman & Co., Denver, has been made an Honorary Commander of the Military Division of the Most Excellent Order of the British Empire.

The award was made last month in recognition of the exceptional service which Gen. Shadle rendered when he was in charge of all chemical warfare matters connected with Allied Forces headquarters during the Second World War.

Advertisers' Index

(The Advertisers' Index has been carefully checked but no responsibility can be assumed for any omission.)

TALE ENDS

THE July issue of *Agricultural Chemicals* carried a little note that Dow Chemical Co., Midland Mich., had prepared a booklet on weed control which would be sent free for the asking. Unfortunately the report was slightly askew, since Dow had intended for it to be distributed among its sales personnel only. A letter from Millard Hooker, Dow advertising manager, says that the company is being deluged with requests for the booklet, and won't we please tell our readers not to write for more copies! Although we are sorry that our little news item may have embarrassed the Midland firm, it did serve to demonstrate again that the readers of this publication are a lively group, quick to respond to suggestions made in the news and advertising pages!

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An entire year's experiments on control of wireworm in potatoes came to naught at Connecticut Agricultural Experiment Station in August when an entire row of the specially-treated tubers was stolen. Dr. James G. Horsfall, director of the station, reported that several thousands of dollars were tied up in the experiment.

Dr. Horsfall indicated that if the unknown thief were to eat the loot, the results might be disastrous. The stolen batch had been treated with the newer types of organic insecticides, most of which are known to be toxic to human beings, and since the plants had been intended for experimental use only, rather than for food, the dosages had been much heavier than would ordinarily be used.

•

Julius Hyman & Co., Denver, have developed a new insect toxicant to be available in limited quantities next year. The new material is said to show promise of being the "best yet" for a number of uses. Hyman Co. reports that the product won't replace chlordane, but results from preliminary experiments have been very encouraging.

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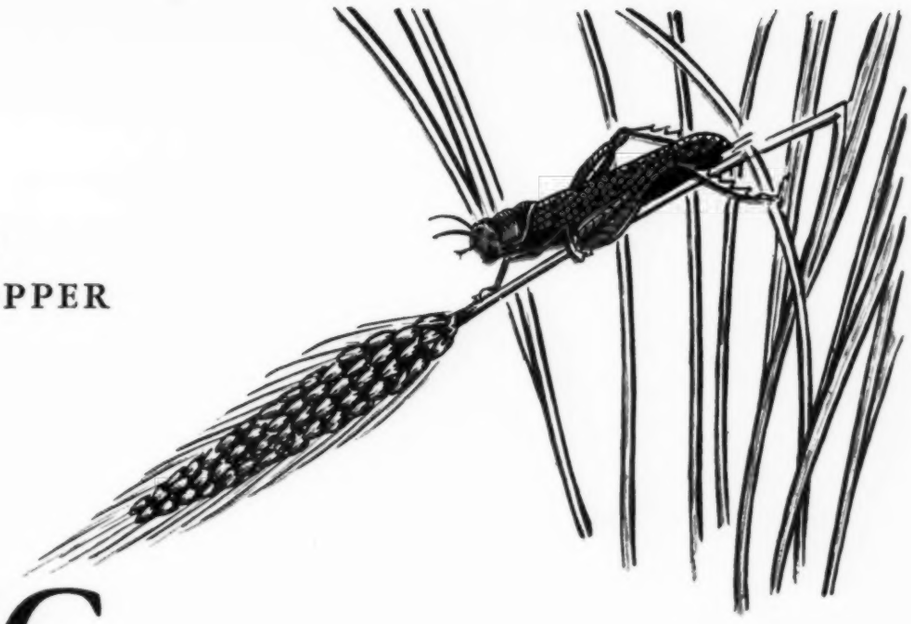
THE
GRASSHOPPER



BUG OF THE MONTH

...controlled with BHC, CHLORDANE, TOXAPHENE

GRASSHOPPERS in teeming swarms have chewed a path through all of recorded history. From the Biblical "plague of the locusts" to the world-wide infestations this year, they have brought famine and death to millions of human beings.

With the new chlorinated toxicants, however, remarkable control can be achieved, far beyond any earlier experience. These new-type poisons appear to be so remarkably effective because they are slowly volatile. They not only kill as the bait is eaten, but tend to deplete the hordes by contact and fumigant action in addition.

Toxicants of this type which have been successfully used are BHC, Chlordane, and Toxaphene. Prentiss offers concentrates based on all three, in the complete line of Prentox Pest-Tested Insecticide Concentrates.

We suggest that you investigate the potentials for grasshopper, locust and cricket control in your marketing area. Full information on the latest developments is available on request.

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